United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
United States Department
of Agriculture, Forest
Service; United States
Department of the
Interior, Bureau of Land
Management and Fish
and Wildlife Service;
Regents of the University
of California (Agricultural
Experiment Station); and
California Department of
Forestry, Soil Vegetation
Survey

Soil Survey of Butte Valley-Tule Lake Area, California,

Parts of Siskiyou and Modoc Counties

How To Use This Soil Survey

General Soil Map

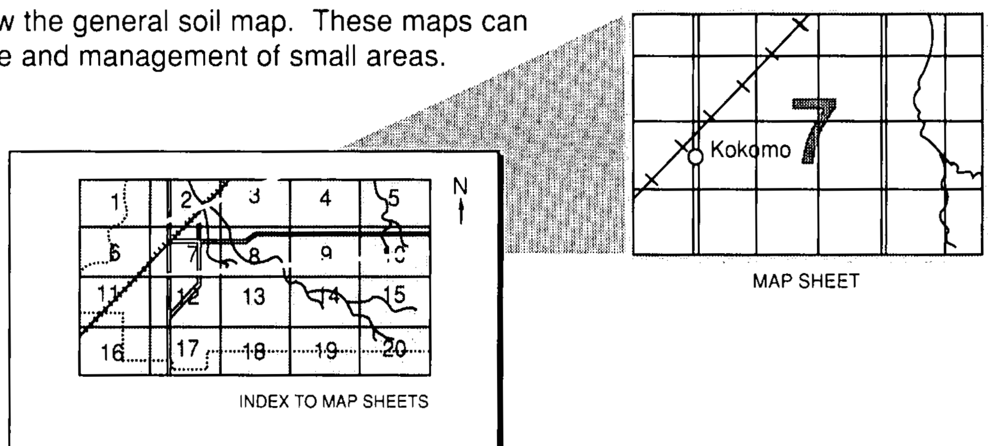
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

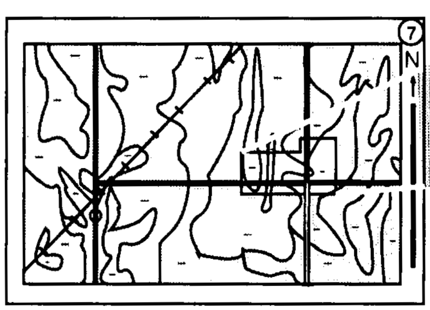
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

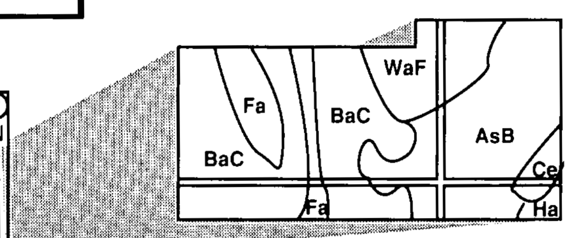
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1985. Soil names and descriptions were approved in 1986. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1985. This survey was made cooperatively by the United States Department of Agriculture, Soil Conservation Service and Forest Service; the United States Department of the Interior, Bureau of Land Management and Fish and Wildlife Service; the Regents of the University of California (Agricultural Experiment Station); and the California Department of Forestry, Soil Vegetation Survey. It is part of the technical assistance furnished to the Butte Valley and Lava Beds Resource Conservation Districts.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Irrigated cropland in an area of Dehill, Fordney, Poman, and Truax soils in the foreground. Mount Shasta is in the background.

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Issued February 1994

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Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in the survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Henry C. Wyman
Acting State Conservationist
Soil Conservation Service

Soil Survey of
Butte Valley-Tule Lake Area, California
Parts of Siskiyou and Modoc Counties

By Joseph J. Jahnke, Soil Conservation Service

Fieldwork by Thomas A. Caudill, Joseph J. Jahnke, and Dennis J. Lytle, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with
United States Department of Agriculture, Forest Service; United States Department of the Interior, Bureau of Land Management and Fish and Wildlife Service; Regents of the University of California (Agricultural Experiment Station); and California Department of Forestry, Soil Vegetation Survey

This survey area is in the northern part of California (fig. 1). It has a total area of 436,800 acres, or about 682 square miles. It is bordered on the north by the State of Oregon, on the west and southwest by the Klamath National Forest, and on the east and southeast by the Modoc National Forest.

This soil survey updates a survey of Butte Valley, Siskiyou County, published in 1909 *(5)*. It provides additional information and has larger maps, which show the soils in greater detail.

General Nature of the Survey Area

This section provides general information about the survey area. It describes history and development; population trends; physiography, relief, and drainage; water supply; and climate.

History and Development

The first record of the exploration of the survey area is John C. Fremont's published account of his expedition in northern California *(4)*. In December 1843, he and his small band of explorers reached the Klamath Marsh, in the northern part of the survey area. After this exploration, trappers employed by the Hudson Bay Company arrived in the survey area. They were attracted by the prospect of rich harvests of beaver, otter, and other furbearers. The trappers were followed by settlers, who began to raise livestock. As the number of ranchers increased, the local Indians of the Modoc Tribe became more and more hostile because of the loss of their land. This hostility led to the Modoc Indian Wars.

The vast marshes in the basins of Lower Klamath Lake and Tule Lake supported large populations of ducks, geese, and swans. In these areas hunters killed large numbers of terns, grebes, and other birds having plumage that was desired by the millinery trade *(23)*.

The Southern Pacific Railroad was built through the survey area in 1907. At that time structures were built across the channel leading from the Klamath River into Lower Klamath Lake. These structures kept the water from flowing into the lake. Within a few years the vast area of water dried up. Under these conditions, peat fires started. In 1908, President Theodore Roosevelt issued Executive Order No. 924. This order established the Lower Klamath National Wildlife Refuge on Lower Klamath Lake.

The Tule Lake area was reclaimed for agriculture when diversion of the Lost River caused the area to dry up. Much of the area adjacent to the Tule Lake National Wildlife Refuge currently is highly developed and profitable farmland. The refuge was established in

Figure 1.—Location of Butte Valley-Tule Lake area in California.

1928, when 11,000 acres that had been covered by surplus irrigation water was set aside for wildlife. During the period 1932 to 1936, the refuge was enlarged to 37,340 acres. This acreage includes all of the land farmed under lease in the old lakebed area.

Butte Valley was first settled in 1906, when a man by the name of McDoel bought 30,000 acres of land. To this farmland he brought settlers who were Dunkards. The Dunkards, German-American Baptists, were experienced farmers from Iowa and other Midwest states *(6)*. They built homes and farm buildings, but an insufficient water supply forced them to leave, discouraged and impoverished.

In 1923, a group of workers arrived to develop an irrigation system. Eventually, the first irrigation well was drilled. Wells are now the major source of irrigation water for Butte Valley.

Population Trends

The population of Siskiyou County increased from 33,031 in 1970 to 39,732 in 1980 *(22)*. The population of the survey area, however, has not been increasing. Dorris and Tulelake are the main urban centers in the area. Minor urban centers are Macdoel and Mount Hebron. The population of Dorris decreased from 840 in 1970 to 783 in 1980 and that of Tulelake decreased from 857 in 1970 to 836 in 1980. Many of the residents leaving the area are young people who were born and raised there. They leave the area to search for improved job opportunities and to pursue higher education.

Physiography, Relief, and Drainage

The central part of the survey area is the Lower Klamath Lake area. To the west of this lake is Butte Valley, and to the east is Tule Lake Basin (fig. 2). The Cascade Range is on the western and southern sides of the survey area *(26)*.

Butte Valley consists of young alluvial fans and old terraces. The Lower Klamath Lake and the Tule Lake Basin areas are characterized by lacustrine deposits derived from diatomite and volcanic ash. Butte Valley is about 17 miles long and averages about 12 miles wide. The southern part of the Lower Klamath Lake area that is in California is about 10 miles long and 10 miles wide. The part of Tule Lake Basin that is adjacent to the State of Oregon is about 13 miles long and 12 miles wide.

The highest and lowest elevations in the survey area are in the southern part of the area. Mount Dome, the highest point, is at an elevation of 6,518 feet. The lowest point, at the southern end of Tule Lake Basin, is at an elevation of 4,030 feet.

The principal drainage outlets in the survey area are near Sams Neck in Butte Valley and Straits Drain in the Lower Klamath Basin. Butte Valley and Tule Lake Basin are closed basins and have no natural drainage outlets. In the early 1900's, Meiss Lake, on the western side of Butte Valley, fluctuated in size throughout the year. To keep the adjacent farmland from being flooded during periods of high rainfall, the Army Corps of Engineers constructed a dike around part of the lake. To drain excess water from the lake, they constructed a canal through Sams Neck. The canal has a pumping station, which raises the water above the basin rim. The water then drains into Rock Creek, which then empties into the Klamath River.

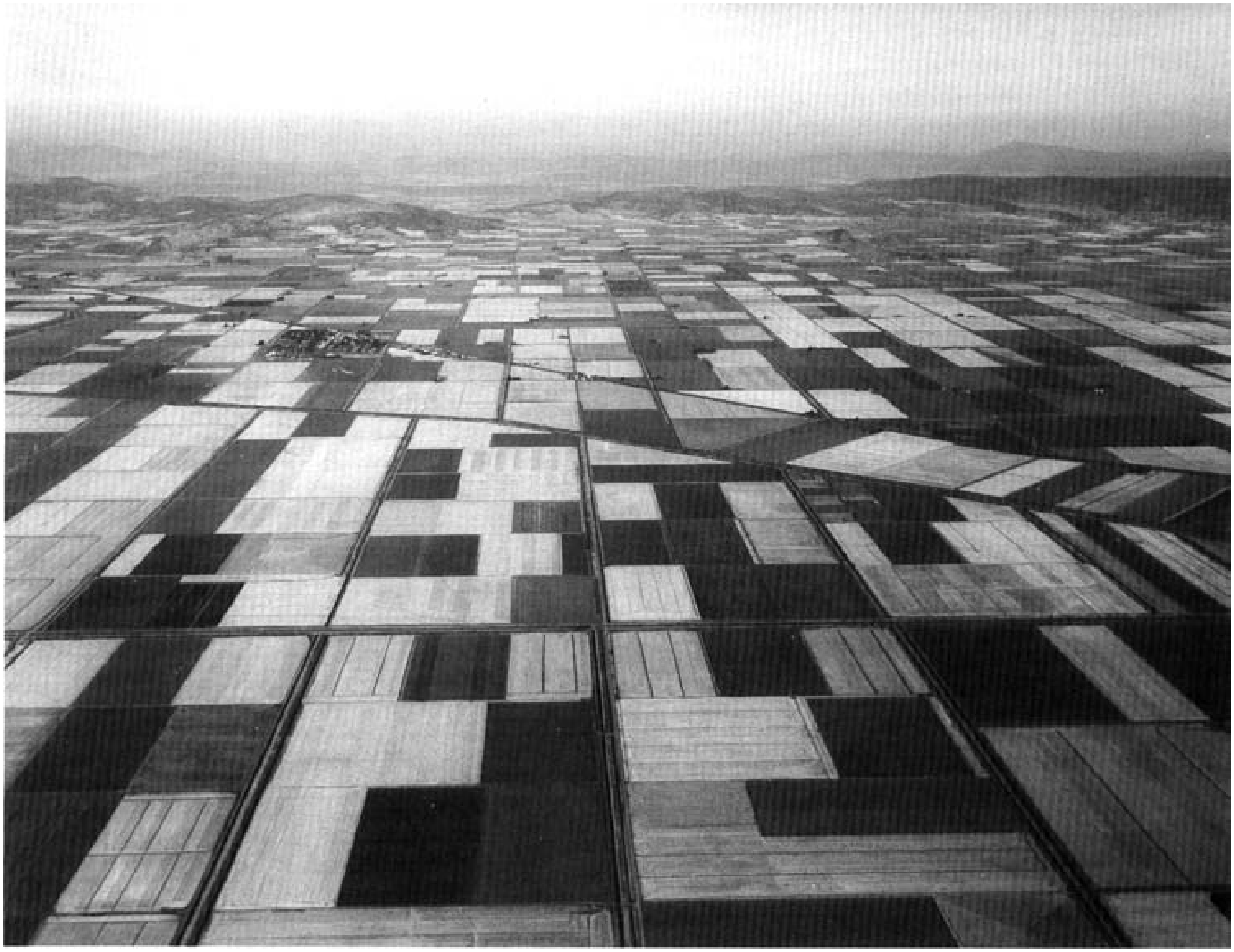

Figure 2.—An area of Tule Lake Basin. The fertile soils in this basin produce high yields of potatoes and small grain.

During the early 1900's, the Tule Lake Basin was covered with water. A tunnel was drilled about 1.5 miles through Sheepy Ridge to pump water from the Tule Lake Basin into the Lower Klamath Lake area. The water now travels through a series of canals and pumping stations and eventually flows into the Klamath River.

Water Supply

The water used in this survey area is obtained from streams, springs, and wells. Butte Creek, Willow Creek, and the Lost River provide most of the surface water used for irrigation.

Water is provided to the area by the Butte Valley and Tulelake Irrigation Districts. The Butte Valley Irrigation District obtains water from Butte Creek and from deep wells for use in irrigating more than 5,800 acres in the southern part of Butte Valley. The Tulelake Irrigation District obtains water from Clear Lake for use in irrigating 5,200 acres in the Tule Lake Basin.

In Butte Valley ground water is the source of a large percentage of the water used for irrigation and domestic purposes *(24)*. The ground water is replenished through deep percolation of direct precipitation and through seepage from streams and areas of excess irrigation water. The most severe problem associated with obtaining the water used in the survey area is the

lowering of the water table. This results in large expenditures for the deepening of wells and for pumping.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

The climate in the survey area is considerably tempered by winds from the Pacific Ocean. Summers are fairly warm, but hot days are rare. Winters are cold, and snow and freezing temperatures are common. During summer the rainfall is extremely light. As a result, the crops growing during this period require irrigation. Several weeks often pass without precipitation. During the rest of the year, rains are frequent, especially late in fall and in winter.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Mount Hebron and Tulelake, California, in the period 1951 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperatures at Mount Hebron and Tulelake are 30 and 32 degrees F, respectively, and the average daily minimum temperature is 18 degrees at Mount Hebron and 21 degrees at Tulelake. The lowest temperature on record, which occurred at Mount Hebron on January 22, 1962, is -29 degrees. In summer, the average temperature is 60 degrees at Mount Hebron and 63 degrees at Tulelake. The average daily maximum temperature is about 80 degrees. The highest recorded temperature, which occurred at Mount Hebron on August 7, 1972, and Tulelake on August 8, 1981, is 102 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 13 inches at Mount Hebron and 11 inches at Tulelake. Of this, about 35 percent usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 2.95 inches at Mount Hebron on December 23, 1964. Thunderstorms occur on about 5 days each year, and most occur in spring.

The average seasonal snowfall is about 29 inches at Mount Hebron and 20 inches at Tulelake. The greatest snow depth at any one time during the period of record was 24 inches at Mount Hebron and 16 inches at Tulelake. On an average of 6 days at Mount Hebron and 12 days at Tulelake, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 45 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines about 90 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the southwest.

In most winters one or two storms in the survey area bring strong and sometimes damaging winds, and in some years the accompanying heavy rains cause serious flooding. Every few years, either in winter or in summer, the invasion of a large continental airmass from the east causes abnormal temperatures. In winter several consecutive days are well below freezing. In summer a week or longer is sweltering.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge gradually into one another as their characteristics gradually change. To construct an accurate map,

however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size, and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey area.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general map units in this survey have been grouped for broad interpretive purposes. Each of the broad groups and the map units in each group are described on the following pages.

Map Unit Descriptions

Mesic Soils in Valleys and Basins

These soils make up about 59 percent of the survey area. They include nearly all of the areas in Butte and Red Rock Valleys and the Lower Klamath and Tule Lake Basins. The soils are nearly level to strongly sloping. Elevation ranges from about 4,030 feet in Tule Lake Basin to 4,800 feet in Red Rock Valley. The average annual precipitation is about 12 inches, and the average annual temperature is about 48 degrees F. The average frost-free period is about 50 to 70 days.

These soils are very deep to shallow and are excessively drained to very poorly drained. The surface layer is loamy or sandy.

These soils are used mainly for cultivated crops, irrigated hay and pasture, rangeland, and wildlife habitat.

1. Capjac-Tulebasin-Lamath

Very deep, nearly level, very poorly drained and poorly drained, loamy soils in lake basins

This map unit is dominantly in the Lower Klamath and Tule Lake Basins. The major soils formed in lacustrine sediment derived dominantly from diatomite, volcanic ash, and extrusive igneous rock. Elevation ranges from 4,030 to 4,100 feet.

This unit makes up about 28 percent of the survey area. It is about 41 percent Capjac soils, 35 percent Tulebasin soils, 10 percent Lamath soils, and 14 percent components of minor extent.

Capjac soils are poorly drained. They have slopes of 0 to 1 percent. Typically, the surface layer is gray silt loam. It is underlain by light gray silt loam that has prominent, dark yellowish brown mottles.

Tulebasin soils are very poorly drained. They have slopes of 0 to 1 percent. Typically, the surface layer is gray mucky silty clay loam. It is underlain by grayish brown and light brownish gray silty clay and light brownish gray silty clay loam that has distinct, yellowish brown mottles.

Lamath soils are poorly drained. They have slopes of 0 to 1 percent. Typically, the surface layer is gray silt loam. The subsoil is light gray silt loam. The subtratum is light brownish gray, grayish brown, and light gray sand and loamy sand.

Of minor extent in this unit are the poorly drained Pit, Teeters, Tulana, and Zuman soils and the very poorly drained Forbar and Tulana Variant soils. Pit soils are on flood plains. They are clayey in the surface layer. Teeters and Zuman soils have a high content of sodium. Tulana soils are not calcareous. Forbar soils are sandy throughout. Tulana Variant soils have a high content of organic matter.

This unit is used for cultivated crops, irrigated hay and pasture, and wildlife habitat. The main management concerns are the hazard of soil blowing, the hazard of

flooding, a seasonal high water table, and the potential for frost, which can occur during any month of the growing season. Soil blowing can be controlled by returning crop residue to the soils and applying a system of conservation tillage. All areas are protected from flooding by dikes. The dikes can fail, however, because they were constructed with material having low strength. Deep drains are needed to lower the water table below the root zone of the crops. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage.

2. Poman-Fordney

Moderately deep and very deep, nearly level to strongly sloping, somewhat excessively drained and excessively drained, sandy soils on alluvial plains and terraces

The major soils in this unit formed in alluvium and lacustrine sediment derived from tuff and other kinds of extrusive igneous rock. Elevation ranges from 4,050 to 4,500 feet.

This unit makes up about 8 percent of the survey area. It is about 37 percent Fordney soils, 38 percent Poman soils, and 25 percent components of minor extent.

Fordney soils are very deep and excessively drained. They have slopes of 0 to 15 percent. Typically, the surface layer is grayish brown loamy fine sand. The subtratum to a depth of 60 inches or more is grayish brown and brown loamy sand.

Poman soils are moderately deep and somewhat excessively drained. They have slopes of 0 to 2 percent. Typically, the surface layer is light brownish gray loamy sand. The subsoil is light brownish gray loamy sand. The next layer is a light yellowish brown and pale brown duripan, which is at a depth of about 29 inches. The underlying material to a depth of 60 inches or more is light brownish gray and pale brown sand.

Of minor extent in this unit are the well drained Dehill soils, the moderately well drained Doel soils, and the somewhat poorly drained Podus and Poe soils. Dehill soils are in the higher positions on the landscape. They are fine sandy loam throughout. Doel soils have a surface layer and subsoil of sandy loam. Podus soils have a duripan at a depth of 10 to 20 inches and have a high water table. Poe soils have a high water table and have a duripan at a depth of 20 to 40 inches.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development. The main management concerns are a rapid rate of water intake, a low available water capacity, the hazard of soil blowing, and the potential for frost, which can occur during any month of the growing season. Because the water intake rate is rapid, sprinkler irrigation is the best method of applying water. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. To avoid overirrigation and the leaching of plant nutrients, applications of irrigation water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soils. Soil blowing can be controlled by returning crop residue to the soils and applying a system of minimum tillage.

3. Inlow-Ocho

Moderately deep and shallow, nearly level, moderately well drained and somewhat poorly drained, saline-sodic, loamy soils on lake terraces

This map unit is on lake terraces that are dominantly in Butte Valley. The major soils formed in lacustrine sediment and alluvium derived from volcanic ash and extrusive igneous rock. Elevation ranges from 4,100 to 4,300 feet.

This unit makes up about 6 percent of the survey area. It is about 56 percent Inlow soils, 35 percent Ocho soils, and 9 percent components of minor extent.

Inlow soils are moderately deep and moderately well drained. They have slopes of 0 to 2 percent. Typically, the surface layer is light gray and light brownish gray silt loam. The subsoil is light gray silt loam and loam. The next layer is a very pale brown hardpan, which is at a depth of about 33 inches. The underlying material to a depth of 60 inches or more is light gray loamy fine sand.

Ocho soils are shallow and somewhat poorly drained. They have slopes of 0 to 2 percent. Typically, the surface layer is light brownish gray and light gray very fine sandy loam. The subsoil is light brown loam. The next layer is a light gray hardpan, which is at a depth of about 18 inches. The upper part of the substratum is light gray silt loam and light brownish gray very fine sandy loam, and the lower part to a depth of 60 inches or more is light brownish gray and light gray loamy sand.

Of minor extent in this unit are the well drained Modoc soils and the somewhat poorly drained Ocho Variant soils. Modoc soils have a surface layer of loam and a subsoil of loam and sandy clay loam. Ocho Variant soils are shallow and have a subsoil of clay.

This unit is used mainly as rangeland. A few small areas are used for irrigated barley. The main management concerns are the hazard of soil blowing and sodicity in areas of the Inlow soils and sodicity, a shallow effective rooting depth, surface crusting, and the hazard of ponding in areas of the Ocho soils.

Because the hazard of soil blowing is moderate, onsite investigation is needed before mechanical treatment measures are applied. The production of forage is limited by the sodicity in both soils and the shallow effective rooting depth in the Ocho soils. Management practices that overcome the sodicity generally are not feasible. Seeding generally is not feasible. Surface crusting can hinder water infiltration.

4. Modoc-Rojo

Moderately deep, nearly level to moderately sloping, well drained, loamy soils on lake terraces and other terraces

This map unit is on terraces that are dominantly in Red Rock Valley and in the northwestern part of Butte Valley. The major soils formed in alluvium and lacustrine sediment derived from extrusive igneous rock and in material weathered from tuff and volcanic ash. Elevation ranges from 4,035 to 4,800 feet.

This unit makes up about 7 percent of the survey area. It is about 44 percent Modoc soils, 29 percent Rojo soils, and 27 percent components of minor extent.

Modoc soils have slopes of 0 to 5 percent. Typically, the surface layer is grayish brown loam. The upper part of the subsoil is light brownish gray loam. The lower part is pale brown sandy clay loam. The next layer is a light gray hardpan, which is at a depth of about 34 inches. The substratum to a depth of 60 inches or more is light gray sand.

Rojo soils have slopes of 0 to 9 percent. Typically, the surface layer is brown sandy loam. The subsoil is pinkish gray and light reddish brown sandy loam. The next layer is a pink duripan, which is at a depth of about 28 inches. Weathered tuff and volcanic ash are at a depth of about 30 inches.

Of minor extent in this unit are the well drained Dehill, Dotta, Mudco, and Truax soils and the moderately well drained Medford, Doel, and Rangee Variant soils. Dehill, Dotta, Medford, and Truax soils are in the higher positions on the landscape. They do not have a duripan and are more than 60 inches deep. Mudco and Rangee Variant soils have a duripan within a depth of 20 inches. Doel soils have a light colored surface layer and are underlain by sand.

This unit is used for cultivated crops, hay and pasture, and rangeland. The main management concerns are the hazard of soil blowing, the depth to a hardpan, a low available water capacity, and the potential for frost, which can occur during any month of the growing season. Soil blowing can be controlled by returning crop residue to the soils and applying a system of conservation tillage. Ripping of the Rojo soils is not feasible because of the limited depth to tuff. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. Good irrigation management helps to prevent the development of a temporary water table above the hardpan. Applications of irrigation water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soils.

5. Truax-Dehill-Eastable

Very deep, nearly level to strongly sloping, well drained, loamy soils on alluvial fans

This map unit is on alluvial fans on the edge of Butte Valley, Red Rock Valley, and the Lower Klamath Basin. The major soils formed dominantly in alluvium derived from tuff and extrusive igneous rock. Elevation ranges from 4,035 to 4,800 feet.

This unit makes up about 6 percent of the survey area. It is about 22 percent Truax soils, 20 percent Dehill soils, 36 percent Eastable soils, and 22 percent components of minor extent.

Truax soils have slopes of 0 to 15 percent. Typically, the surface layer is brown fine sandy loam. The subsoil is brown sandy clay loam. The upper part of the substratum is yellowish brown sandy loam. The lower part to a depth of 60 inches or more is yellowish brown and brown sandy loam.

Dehill soils have slopes of 0 to 15 percent. Typically, the surface layer, the subsoil, and the upper part of the substratum are dark grayish brown fine sandy loam. The lower part of the substratum to a depth of 60 inches or more is brown fine sandy loam.

Eastable soils have slopes of 0 to 15 percent. Typically, the surface layer is light brownish gray loam. The subsoil is light brownish gray clay loam. The upper part of the substratum is pale brown loam. The lower part to a depth of 60 inches or more is very pale brown loam.

Of minor extent in this unit are the well drained Dotta, Hedox, and Munnell soils and the moderately well drained Leavers soils. Dotta soils have a thick, dark surface layer. They receive more rainfall than the major soils. Hedox soils are 20 to 40 inches deep. Munnell and Leavers soils have a contrasting texture of very gravelly sand within a depth of 40 inches.

This unit is used for cultivated crops, irrigated hay and pasture, and rangeland. The main management concerns in areas of the Dehill and Truax soils are the hazard of soil blowing and the potential for frost, which can occur during any month of the growing season. There are few limitations in areas of the Eastable soils. Soil blowing can be controlled by returning crop residue to the soils and applying a system of conservation

tillage. Seeding disturbed areas of rangeland to native or tame pasture plants helps to control soil blowing.

6. Laki-Lalos

Very deep, nearly level to strongly sloping, moderately well drained and well drained, saline-sodic, loamy soils on terraces and in areas of dunes on lakeshores.

This map unit is on the eastern side of the Lower Klamath Basin and on the Oregon-California state line northeast of the town of Tulelake. The major soils formed in alluvium and lacustrine sediment derived from basalt, diatomite, and volcanic ash and in eolian material derived from lacustrine sediment. Elevation ranges from 4,035 to 4,200 feet.

This unit makes up about 4 percent of the survey area. It is about 64 percent Laki soils, 10 percent Lalos soils, and 26 percent components of minor extent.

Laki soils are moderately well drained. They have slopes of 0 to 2 percent. Typically, the surface layer is grayish brown fine sandy loam. The subsoil is light brownish gray and light gray loam. The substratum to a depth of 60 inches or more is very pale brown loam.

Lalos soils are well drained. They have slopes of 2 to 15 percent. Typically, the surface layer is pale brown and light brownish gray very fine sandy loam. The upper part of the subsoil is light gray loam. The lower part is pinkish gray clay loam. The upper part of the substratum is very pale brown loam. The lower part to a depth of 65 inches or more is pale brown very fine sandy loam.

Of minor extent in this unit are Blownout land, the somewhat poorly drained Henley soils, the moderately well drained Zanbur soils, and the poorly drained Zuman soils. Blownout land consists of areas where all or most of the soil material has been removed by the wind and tuff has been exposed. Henley soils have a hardpan. Zanbur and Zuman soils have contrasting textures within a depth of 40 inches.

This unit is used for cultivated crops, irrigated hay and pasture, rangeland, and homesite development. The main management concerns are the hazard of soil blowing, salinity, and sodicity. When the wind velocity is high in spring, the hazard of soil blowing can be reduced by returning all crop residue to the soils and by minimizing tillage. The content of toxic salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soils.

Mesic Soils on the Lower Foothills of the Cascade Mountain Range

These soils make up about 33 percent of the survey area. They include nearly all areas east of the Tule Lake Basin and between the Lower Klamath Basin and Butte Valley. The soils are nearly level to very steep. Elevation ranges from 4,100 to 5,500 feet. The average annual precipitation is about 12 to 14 inches, and the average annual temperature is about 48 degrees F. The average frost-free period is about 65 days.

These soils are very shallow to moderately deep. The surface layer is loamy, cobbly and loamy, very cobbly and loamy, or very stony and loamy.

These soils are used for rangeland and the production of western juniper.

7. Searles-Orhood

Moderately deep and shallow, gently sloping to very steep, well drained, very stony or very cobbly, loamy soils on hills and mountains

This map unit is on hills and mountains between the Lower Klamath Basin and Butte Valley. The major soils formed in material weathered from extrusive igneous rock. Elevation ranges from 4,200 to 5,500 feet.

This unit makes up about 16 percent of the survey area. It is about 44 percent Searles soils, 20 percent Orhood soils, and 36 percent components of minor extent.

Searles soils are moderately deep. They have slopes of 2 to 50 percent. Typically, the surface layer is dark grayish brown very stony loam. The upper part of the subsoil is dark grayish brown very cobbly loam. The lower part is brown very cobbly clay loam and very cobbly loam. Extrusive igneous bedrock is at a depth of about 28 inches.

Orhood soils are shallow. They have slopes of 2 to 50 percent. Typically, the surface layer is grayish brown very cobbly loam. The upper part of the subsoil also is grayish brown very cobbly loam. The lower part is grayish brown, yellowish brown, and light yellowish brown very cobbly clay loam and very cobbly loam. Extrusive igneous bedrock is at a depth of about 16 inches.

Of minor extent in this unit are areas of the well drained Bucklake, Demox, Dehill, Dunnlake, Kalo, Karoc, Lequieu, Madeline, Munnell, and Truax soils and areas of Rock outcrop and Rubble land. Bucklake, Dunnlake, and Madeline soils have a clayey subsoil. Dehill, Demox, Kalo, Karoc, Munnell, and Truax soils are more than 60 inches deep. Lequieu soils are less than 10 inches deep. Rock outcrop occurs as areas of exposed bedrock. Rubble land consists of areas where 90 percent or more of the surface is covered with stones and boulders that generally are underlain by bedrock.

This unit is used for rangeland and the production of western juniper. The main management concerns are

the slope and the stones on and below the surface. The surface stoniness limits access by most equipment, including seeding equipment. This limitation can be minimized by broadcast seeding methods. The high content of gravel, stones, and cobbles in the soils reduces the amount of moisture available for plant growth. The slope limits access by livestock. As a result, the less sloping areas tend to be overgrazed. In areas that support western juniper, the surface stoniness limits the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not economically feasible.

8. Dunnlake-Lequieu

Shallow and very shallow, nearly level to steep, well drained, very stony, loamy soils on plateaus and mountain side slopes

This map unit is in scattered areas throughout the survey area. The major soils formed in material weathered from extrusive igneous rock. Elevation ranges from 4,100 to 4,800 feet.

This unit makes up about 8 percent of the survey area. It is about 44 percent Dunnlake soils, 17 percent Lequieu soils, and 39 percent components of minor extent.

Dunnlake soils are shallow. They have slopes of 0 to 50 percent. Typically, the surface layer is grayish brown very stony loam. The upper part of the subsoil is grayish brown clay loam. The lower part is brown and yellowish brown gravelly clay. Hard, extrusive igneous bedrock is at a depth of about 16 inches.

Lequieu soils are very shallow. They have slopes of 0 to 9 percent. Typically, the surface layer is pale brown very stony loam. The substratum is pale brown very cobbly loam about 5 inches thick. Andesite bedrock is at a depth of about 8 inches.

Of minor extent in this unit are Adieux, Bucklake, Capona, Denbar, Rangee, Salisbury, and Stukel soils. Adieux soils are in areas of mounds on plateaus. They are more than 20 inches deep. Bucklake, Capona, Rangee, and Salisbury soils have bedrock at a depth of 20 to 40 inches. Denbar soils have a hardpan at a depth of 40 to 60 inches. Stukel soils are 10 to 20 inches deep over bedrock.

This unit is used as rangeland. The main management concerns are the surface stoniness and the restricted depth to bedrock. The surface stoniness limits access by most equipment, including seeding equipment. This limitation can be minimized by broadcast seeding methods. The production of forage is limited by a shallow effective rooting depth. The species that can withstand droughtiness should be selected for seeding.

9. Stukel-Capona-Hedox

Shallow and moderately deep, nearly level to moderately steep, well drained, loamy or loamy and sandy soils on hills, terraces, pediments, and the side slopes of plateaus

This map unit is in the Willow Creek area and near areas of tableland. The major soils formed in material weathered from tuff and extrusive igneous rock. Elevation ranges from 4,100 to 4,800 feet.

This map unit makes up about 6 percent of the survey area. It is about 25 percent Stukel soils, 25 percent Capona soils, 24 percent Hedox soils, and 26 percent components of minor extent.

Stukel soils are shallow. They have slopes of 2 to 30 percent. Typically, the surface layer is grayish brown sandy loam. The upper part of the substratum is brown sandy loam. The lower part is pale brown sandy loam. Hard, extrusive igneous bedrock is at a depth of about 17 inches.

Capona soils are moderately deep. They have slopes of 0 to 30 percent. Typically, the surface layer is grayish brown and brown cobbly loam. The subsoil is brown and light yellowish brown cobbly loam. Hard, extrusive igneous bedrock is at a depth of about 34 inches.

Hedox soils are moderately deep. They have slopes of 2 to 30 percent. Typically, the surface layer is light gray and very pale brown loam. The upper part of the substratum is pale brown loam. The lower part is very pale brown gravelly loam. Weathered diatomite and tuff bedrock is at a depth of about 27 inches.

Of minor extent in this unit are areas of the well drained Porterfield and Eastable soils and areas of Rock outcrop. Porterfield soils are shallow and formed in material weathered from diatomite and tuff. Eastable soils are on alluvial fans. Rock outcrop is mainly extrusive igneous rock.

This unit is used as rangeland. The main management concerns in areas of the Stukel soils are the hazard of soil blowing and the restricted depth to bedrock. Soil properties seldom limit range management on the Capona and Hedox soils. Because the hazard of soil blowing is moderate, onsite investigation is needed before mechanical treatment measures are applied. Seeding disturbed areas to native or tame pasture plants helps to control soil blowing. The production of forage is limited by a shallow effective rooting depth in the Stukel soils.

10. Lorella-Fiddler

Shallow and moderately deep, moderately sloping to moderately steep, well drained, very stony, loamy soils on hills

This map unit is along the California-Oregon state line in the northeastern corner of the survey area. The major soils formed in material weathered dominantly from extrusive igneous rock. Elevation ranges from 4,200 to 4,800 feet.

This unit makes up about 3 percent of the survey area. It is about 36 percent Lorella soils, 30 percent Fiddler soils, and 34 percent components of minor extent.

Lorella soils are shallow. They have slopes of 5 to 30 percent. Typically, the surface layer is brown and dark grayish brown very stony loam. The upper part of the subsoil is dark grayish brown very cobbly clay loam. The lower part is dark brown very cobbly clay. Extrusive igneous bedrock is at a depth of about 16 inches.

Fiddler soils are moderately deep. They have slopes of 5 to 30 percent. Typically, the surface layer is grayish brown very stony loam. The upper part of the subsoil is brown very stony clay loam and very stony clay. The lower part is strong brown very stony clay loam. Extrusive igneous bedrock is at a depth of about 26 inches.

Of minor extent in this unit are Denbar, Dotta, and Salisbury soils. Denbar soils formed in alluvium and have a hardpan at a depth of 40 to 60 inches. Dotta soils formed in alluvium and are more than 60 inches deep. Salisbury soils have a duripan at a depth of 20 to 40 inches.

This unit is used for livestock grazing and the production of western juniper. The main management concerns are the surface stoniness and the slope, which limit the accessibility for woodcutting and other activities involving the use of equipment. Management practices that overcome these limitations generally are not feasible. Where the density of the woodland canopy is less than 40 percent, the soils produce a limited grazeable understory. Properly managing livestock grazing helps to prevent excessive erosion.

Frigid Soils of the Cascade Mountain Range

These soils make up about 8 percent of the survey area. They include nearly all areas south and west of Butte Valley. The soils are moderately sloping to steep. The average annual precipitation is about 25 inches, and the average annual temperature is about 44 degrees F. The average frost-free period is about 65 days.

These soils are moderately deep and deep and are well drained. The surface layer is stony and loamy or very stony and loamy.

These soils are used for woodland and for livestock grazing.

11. Kalo-Pinehurst-Mojo

Moderately deep and deep, moderately sloping to steep, well drained, stony and very stony, loamy soils on mountains

This map unit is on the mountains south and west of Butte Valley. The major soils formed in material weathered from extrusive igneous rock. Elevation ranges from 4,400 to 6,500 feet.

This unit makes up about 8 percent of the survey area. It is about 27 percent Kalo soils, 19 percent Pinehurst soils, 12 percent Mojo soils, and 42 percent components of minor extent.

Kalo soils are moderately deep. They have slopes of 5 to 50 percent. Typically, the surface layer is brown very stony sandy loam. The upper part of the subsoil is brown very cobbly loam. The lower part is brown very cobbly clay loam. Hard, extrusive igneous bedrock is at a depth of about 27 inches.

Pinehurst soils are deep. They have slopes of 5 to 30 percent. Typically, the surface layer is brown stony sandy loam. The upper part of the subsoil is brown gravelly loam. The lower part is light brown gravelly and very stony loam. Extrusive igneous bedrock is at a depth of about 55 inches.

Mojo soils are moderately deep. They have slopes of 5 to 30 percent. Typically, the surface layer is brown stony loam. The upper part of the subsoil is brown and light brown clay loam. The lower part is reddish yellow very gravelly clay loam. Hard, extrusive igneous bedrock is at a depth of about 36 inches.

Of minor extent in this unit are the somewhat excessively drained Avis soils; the very poorly drained Esro soils; the well drained Fredonyer, Mahogan, Orset, Sheld, and Snell soils; and Rock outcrop. Avis and Sheld soils have a high content of volcanic ash. Esro and Orset soils are very deep. They are on stream terraces. Fredonyer and Mahogan soils generally have a surface layer that is thicker than that of the major soils. Also, they are in areas that receive less rainfall. Snell soils have a clayey subsoil. Rock outcrop occurs as areas of exposed bedrock.

This unit is used mainly as woodland. Some areas are used for livestock grazing. The main management concern is the hazard of erosion in the steeper areas. Conventional harvesting methods can be used, but they may be restricted from November through June because of wetness or snow. The soils are limited as sites for road construction and logging because of large

stones. Control of plant competition after trees are harvested helps to ensure seedling survival. The time and intensity of grazing by livestock and wildlife markedly influence the production and composition of the plant community. Excessive grazing of browse and forage by deer and livestock lowers the potential for forage production, damages the browse plants, and hinders reforestation.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Fordney loamy fine sand, 0 to 2 percent slopes, is a phase of the Fordney series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes. A *complex* consists of two or more soils or miscellaneous areas that occur in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Inlow-Ocho-Modoc

complex, 0 to 2 percent slopes, is an example.

This survey includes *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Rubble land is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The "Glossary" defines many of the terms used in describing the soils or miscellaneous areas.

Map Unit Descriptions

101—Avis stony sandy loam, 5 to 30 percent slopes. This very deep, somewhat excessively drained soil is on mountains. It formed in deposits of volcanic ash. The native vegetation is mainly mixed conifers, perennial grasses, forbs, and shrubs. Elevation is 5,000 to 5,800 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 60 days. Frost can occur during any month of the year.

Typically, about 9 percent of the surface is covered with stones and cobbles. The surface layer is light brownish gray stony sandy loam about 9 inches thick. The upper 8 inches of the substratum is pale brown very gravelly loamy fine sand, the next 10 inches is light yellowish brown very gravelly loamy fine sand, and the lower part to a depth of 60 inches or more is light yellowish brown very gravelly sand.

Included in this unit are small areas of Pinehurst stony sandy loam and Kalo stony sandy loam. Also included are small areas of Sheld stony sandy loam. Included areas make up about 15 percent of the total acreage.

Permeability is rapid in the Avis soil. Available water capacity is very low or low. The effective rooting depth is 60 inches or more. Runoff is medium or rapid, and the hazard of water erosion is moderate or severe.

This unit is used for woodland and livestock grazing.

Ponderosa pine, white fir, and Douglas-fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index is 73 for ponderosa pine. The potential annual production of ponderosa pine is about 29 cubic feet, or 151 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees.

Seedling mortality and plant competition are the main concerns affecting timber production. Proper site preparation controls initial plant competition, and spraying controls the subsequent growth of competing plants. Unless the site is adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. The very low or low available water capacity generally reduces the seedling survival rate in areas where understory plants are numerous. Examples of suitable trees are ponderosa pine and white fir.

Where this unit is used for livestock grazing, the forest canopy is less than 40 percent. The characteristic understory plant community is mainly manzanita, ceanothus, and Sierra chinkapin.

This unit is in capability unit IVe-1, nonirrigated, and in MLRA 22.

102—Capjac silt loam, 0 to 1 percent slopes. This very deep, artificially drained soil is in lake basins. It is protected from flooding by dikes and levees. The water table is controlled by pumping from deep lateral drains. The soil formed in poorly drained lacustrine sediment derived from diatomite and volcanic ash. The vegetation in areas that are not cultivated is mainly grasses and sedges. Elevation is 4,030 to 4,100 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

Typically, the surface layer is gray silt loam about 26 inches thick. The substratum to a depth of 60 inches or more is light gray, slightly saline silt loam that has prominent, dark yellowish brown mottles.

Included in this unit are small areas of soils that are similar to the Capjac soil but are very poorly drained, have a surface layer that is 4 to 10 inches thick, or are strongly alkaline or very strongly alkaline. Included areas make up about 10 percent of the total acreage.

Permeability is moderate in the Capjac soil. Available water capacity is very high because of the influence of diatomite and volcanic ash. The effective rooting depth is 60 inches or more, but it is affected by the water table, which is maintained at a depth of 1.5 to more than 3.0 feet throughout the year. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate when the surface is dry and the wind velocity is high. This soil is subject to rare flooding from October through May unless it is protected by dikes and levees.

This unit is used for wildlife habitat, cultivated crops, and irrigated hay and pasture.

This unit is frequented by migratory waterfowl. It provides food and cover for such wildlife species as ducks, geese, ring-necked pheasants, and birds of prey. Developing shallow water areas can improve the habitat for waterfowl.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the hazard of soil blowing, the hazard of flooding, the

seasonal high water table, and the likelihood that frost will occur during any month of the growing season. Soil blowing can be controlled by returning crop residue to the soil and applying a system of conservation tillage. Floodwater and the high water table can damage crops by submerging them. The wetness can delay or inhibit farming in spring. Although all areas are protected from flooding by dikes, the dikes can fail because they are constructed with material having low strength. Deep drains are needed to lower the water table below the root zone of the crops. Because drainage outlets are not available, pumps are needed.

Border and sprinkler irrigation systems are suitable on this unit. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. Many areas are subirrigated by the water table, but this method of irrigation can increase the amount of sodium and salts in the soil. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Because of the very high available water capacity, the frequency of irrigation can be reduced. The accumulation of water at the end of borders can be minimized by proper irrigation management.

If this unit is used for irrigated hay and pasture, the main management concern is the seasonal high water table. The wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control soil blowing. Irrigation water can be applied by the border and sprinkler methods. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the plants but also to the available water capacity and rate of water intake in the soil. Because of the very high available water capacity, the frequency of irrigation can be reduced.

If this unit is used for windbreaks and environmental plantings, the main management concerns are the hazard of flooding and the seasonal high water table. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. The trees and shrubs selected for planting should be those that can withstand seasonal wetness. Examples are hybrid poplar, golden willow, Russian-olive, and multiflora rose.

This unit is in capability subclasses IIIw, irrigated, and IVw, nonirrigated, and in MLRA 21.

103—Capjac silt loam, ponded, 0 to 1 percent slopes. This very deep, poorly drained soil is in lake basins. It formed in lacustrine sediment derived from diatomite and volcanic ash. Water ponds on the surface. The native vegetation is mainly cattails and rushes. Elevation is 4,030 to 4,100 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

Typically, the surface is covered with 6 to 24 inches of water. The surface layer is gray silt loam about 26 inches thick. The substratum to a depth of 60 inches or more is light gray, slightly saline silt loam that has prominent, dark yellowish brown mottles.

Included in this unit are small areas of Lamath silt loam and Tulana silt loam. Included areas make up about 10 percent of the total acreage.

Permeability is moderate in the Capjac soil. Available water capacity is very high because of the influence of diatomite and volcanic ash. The effective rooting depth is 60 inches or more, but it is affected by the water table, which is as much as 2 feet above the surface during the entire year.

This unit is used for wildlife habitat. It is frequented by migratory waterfowl. It provides food and cover for such wildlife species as ducks, geese, ring-necked pheasants, and birds of prey. The characteristic vegetation is mainly cattails and rushes.

This unit is in capability subclass Vw, nonirrigated, and in MLRA 21.

104—Capona cobbly loam, 5 to 30 percent slopes. This moderately deep, well drained soil is on terraces and pediments. It formed in material weathered from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,700 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is about 80 days.

Typically, about 20 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown and brown cobbly loam about 10 inches thick. The subsoil is brown cobbly loam about 24 inches thick. Hard, extrusive igneous bedrock is at a depth of about 34 inches.

Included in this unit are small areas of Truax fine sandy loam and Orhood very cobbly loam. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability is moderate in the Capona soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is

medium or rapid, and the hazard of water erosion is moderate or severe.

This unit is used as rangeland. The surface stoniness is the main concern affecting range management. It limits access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. Western juniper readily invades areas of this unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly Idaho fescue, bluebunch wheatgrass, Thurber needlegrass, rabbitbrush, and mountain big sagebrush.

In areas that have been invaded by western juniper, the mean site index is 26, on the basis of a 50-year site index. The soil can produce 632 cubic feet of wood per acre in a stand of trees that average 50 square feet in the basal area and 15.7 inches in diameter at breast height. The stoniness and the slope limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

This unit is in capability subclass VIe, nonirrigated, and in MLRA 21.

105—Capona-Rock outcrop complex, 0 to 5 percent slopes. This map unit is on terraces and pediments. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,700 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 80 days. Frost can occur during any month of the year.

This unit is about 55 percent Capona soil and 35 percent Rock outcrop.

Included in this unit are small areas of Stukel sandy loam and a soil that is similar to the Capona soil but has hard bedrock at a depth of more than 40 inches. Included areas make up about 10 percent of the total acreage.

The Capona soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 20 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown and brown cobbly loam about 10 inches thick. The subsoil is brown cobbly loam about 24 inches thick. Hard bedrock is at a depth of about 34 inches.

Permeability is moderate in the Capona soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

Rock outcrop occurs as areas of exposed bedrock. Most areas are barren, but some support a few grasses and brush, which grow between the rocks.

This unit is used as rangeland. The main concerns affecting range management are the surface stoniness in areas of the Capona soil and the Rock outcrop. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. Western juniper readily invades areas of the Capona soil. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly bluebeatgrass, Thurber needlegrass, Idaho fescue, and mountain big sagebrush.

Where the Capona soil has been invaded by western juniper, the mean site index is 26, on the basis of a 50-year site index. The soil can produce 632 cubic feet of wood per acre in a stand of trees that average 50 square feet in the basal area and 15.7 inches in diameter at breast height. The stoniness limits the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

The Capona soil is in capability subclass VIe, nonirrigated, and the Rock outcrop is in capability class VIII. Both are in MLRA 21.

106—Dehill fine sandy loam, 0 to 5 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,035 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

Typically, the surface layer is dark grayish brown fine sandy loam about 15 inches thick. The subsoil is dark grayish brown fine sandy loam about 12 inches thick. The upper 17 inches of the substratum is dark grayish brown fine sandy loam. The lower part to a depth of 60

inches or more is brown fine sandy loam. Stones and cobbles cover 0 to 5 percent of the surface.

Included in this unit are small areas of Truax fine sandy loam, Fordney loamy fine sand, and Searles very stony loam. Also included are small areas of Capona cobbly loam. Included areas make up about 10 percent of the total acreage.

Permeability is moderately rapid in the Dehill soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for cultivated crops, hay and pasture, and rangeland.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the hazard of soil blowing and the likelihood that frost will occur during any month of the growing season. Soil blowing can be controlled by returning crop residue to the soil and applying a system of conservation tillage. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Sprinkler irrigation systems are suitable on this unit. The method used generally is governed by the crop that is grown. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage.

Few limitations affect the production of irrigated hay and pasture. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Sprinkler irrigation systems are suitable on this unit. The water should be applied in amounts that are sufficient to wet the root zone but are small enough to minimize the leaching of plant nutrients.

The main concern affecting range management is the hazard of soil blowing. Seeding disturbed areas to native or tame pasture plants helps to control soil blowing. The potential plant community is mainly basin wildrye, bluebunch wheatgrass, mountain big sagebrush, and rabbitbrush.

Few limitations affect the use of this unit for windbreaks and environmental plantings. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are Norway spruce, hybrid poplar, Russian-olive, and lilac.

This unit is in capability unit IIIe-1, irrigated, and capability subclass VIe, nonirrigated. It is in MLRA 21.

107—Dehill fine sandy loam, 5 to 15 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,035 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

Typically, the surface layer is dark grayish brown fine sandy loam about 15 inches thick. The subsoil is dark grayish brown fine sandy loam about 12 inches thick. The upper 17 inches of the substratum is dark grayish brown fine sandy loam. The lower part to a depth of 60 inches or more is brown fine sandy loam. Stones and cobbles cover 0 to 3 percent of the surface.

Included in this unit are small areas of Truax fine sandy loam, Capona cobbly loam, and Searles very stony loam. Also included are small areas of Fordney loamy fine sand. Included areas make up about 10 percent of the total acreage.

Permeability is moderately rapid in the Dehill soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

This unit is used as rangeland. The main concern affecting range management is the hazard of soil blowing. Seeding disturbed areas to native or tame pasture plants helps to control soil blowing. The potential plant community is mainly basin wildrye, bluebunch wheatgrass, mountain big sagebrush, and rabbitbrush.

Few limitations affect the use of this unit for windbreaks and environmental plantings. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are Norway spruce, hybrid poplar, Russian-olive, and lilac.

This unit is in capability subclass VIe, nonirrigated, and in MLRA 21.

108—Demox stony sandy loam, 2 to 15 percent slopes. This very deep, well drained soil is on the colluvial side slopes of mountains, hills, and escarpments. It formed in colluvium derived from basalt and tuff. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,035 to 4,800 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

Typically, about 10 percent of the surface is covered

with boulders, stones, and cobbles. Also, the surface is covered by a mat of leaves and stems about 1 inch thick. The surface layer is dark grayish brown stony sandy loam about 12 inches thick. The underlying material to a depth of 62 inches is brown and pale brown very gravelly sandy loam.

Included in this unit are small areas of Stukel sandy loam and Capona cobbly loam. Also included are small areas of a soil that is similar to the Demox soil but has less than 35 percent rock fragments and small areas where more than 15 percent of the surface is covered with rock fragments. Included areas make up about 15 percent of the total acreage.

Permeability is moderately rapid in the Demox soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

This unit is used as rangeland. Few limitations affect range management. The unit responds well to range seeding and to proper grazing use. Western juniper readily invades the unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly bluebunch wheatgrass, Thurber needlegrass, mountain big sagebrush, and rabbitbrush.

In areas that have been invaded by western juniper, the mean site index is 26, on the basis of a 50-year site index. The soil can produce 290 cubic feet of wood per acre in a stand of trees that average 27 square feet in the basal area and 13 inches in diameter at breast height. The stoniness limits the accessibility for woodcutting and other activities involving the use of equipment. Management practices that help to overcome this limitation generally are not feasible.

This unit is in capability unit IVe-7, nonirrigated, and in MLRA 21.

109—Demox-Rubble land complex, 15 to 50 percent slopes. This map unit is on the colluvial side slopes of mountains, hills, and escarpments. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 5,000 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

This unit is about 65 percent Demox soil and 25 percent Rubble land.

Included in this unit are small areas of Stukel sandy loam and Capona cobbly loam. Also included are small areas of soils that are similar to the Demox soil but have less than 35 percent rock fragments or have bedrock at a depth of 20 to 40 inches. Included areas make up about 10 percent of the total acreage.

The Demox soil is very deep and well drained. It formed in colluvium derived from basalt and tuff. Typically, about 30 percent of the surface is covered with stones and cobbles. Also, the surface is covered with a mat of leaves and stems about 1 inch thick. The surface layer is dark grayish brown very stony sandy loam about 12 inches thick. The underlying material to a depth of 62 inches is brown and pale brown very gravelly sandy loam.

Permeability is moderately rapid in the Demox soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe.

Rubble land occurs as loose basalt cobbles, stones, and boulders. It generally is barren, but some grasses and brush grow at the edge of the areas, where water runs off and where the boulders, stones, and cobbles are not so close together.

This unit is used as rangeland. The main concerns affecting range management on the Demox soil are the slope and the surface stoniness. The slope limits access by livestock and can result in overgrazing of the less sloping areas. Livestock distribution can be improved by properly located fences and livestock watering facilities. The stones on the surface and the slope limit access by most equipment. Limited access for seeding can be partially overcome by broadcast seeding methods.

Western juniper readily invades areas of the Demox soil. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly bluebunch wheatgrass, Thurber needlegrass, mountain big sagebrush, and rabbitbrush.

Where the Demox soil has been invaded by western juniper, the mean site index is 26, on the basis of a 50-year site index. The soil can produce 290 cubic feet of wood per acre in a stand of trees that average 27 square feet in the basal area and 13 inches in diameter at breast height. The slope and the stoniness limit the accessibility for woodcutting and other activities involving the use of equipment. Management practices

that overcome these limitations generally are not feasible.

The Demox soil is in capability subclass VIe, nonirrigated, and the Rubble land is in capability class VIII. Both are in MLRA 21.

110—Doel sandy loam, 0 to 2 percent slopes. This moderately deep, moderately well drained soil is on alluvial plains. It formed in alluvium derived from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,300 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is about 40 days. Frost can occur during any month of the year.

Typically, the surface layer is light brownish gray sandy loam about 14 inches thick. The subsoil is pale brown sandy loam about 15 inches thick. The next layer is a light gray hardpan about 19 inches thick. The underlying material to a depth of 60 inches or more is dark grayish brown sand.

Included in this unit are small areas of Poman loamy sand, Munnell gravelly loam, Ocho very fine sandy loam, and Inlow silt loam. Included areas make up about 15 percent of the total acreage.

Permeability is moderately rapid in the Doel soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for cultivated crops, irrigated hay and pasture, and rangeland.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the hazard of soil blowing, the restricted depth to a hardpan, the low available water capacity, and the likelihood that frost will occur during any month of the growing season. Soil blowing can be controlled by returning crop residue to the soil and applying a system of conservation tillage. Ripping and shattering the hardpan can increase the effective rooting depth and improve the internal drainage.

Sprinkler irrigation systems are suitable on this unit. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. Good irrigation management helps to prevent the development of a temporary water table above the hardpan. Applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil.

If this unit is used for irrigated hay and pasture, the main management concerns are the restricted depth to a hardpan and the low available water capacity. Ripping and shattering the hardpan can increase the effective rooting depth. Good irrigation management helps to prevent the development of a temporary water table above the hardpan. Applications of water should be adjusted not only to the needs of the plants but also to the available water capacity and rate of water intake in the soil. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Sprinkler irrigation is the best method of applying water.

The main concerns affecting range management are the sandy texture and the hazard of soil blowing. The sandy texture reduces the amount of water available to plants. The species that can withstand droughtiness should be selected for seeding. Seeding disturbed areas to native or tame pasture plants helps to control soil blowing. Rabbitbrush readily increases in abundance on this unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where rubber rabbitbrush has increased in abundance, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly basin wildrye, Indian ricegrass, Thurber needlegrass, rabbitbrush, and big sagebrush.

Few limitations affect the use of this unit for windbreaks and environmental plantings. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are ponderosa pine, black locust, American plum, and Tatarian honeysuckle.

This unit is in capability unit IIIe-8, irrigated, and capability subclass VIe, nonirrigated. It is in MLRA 21.

111—Dotta sandy loam, 0 to 5 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 4,800 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown sandy loam about 15 inches thick. The subsoil is grayish brown and brown loam about 15 inches thick. The

substratum to a depth of 60 inches or more is brown sandy loam.

Included in this unit are small areas of soils that are similar to the Dotta soil but are not characterized by a significant increase in the content of clay in the subsoil. Also included are small areas of Adieux sandy loam and Salisbury cobbly loam. Included areas make up about 10 percent of the total acreage.

Permeability is moderately slow in the Dotta soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for cultivated crops, irrigated hay and pasture, and rangeland.

If this unit is used for nonirrigated wheat or for irrigated wheat, barley, oats, or potatoes, the main management concerns are the hazard of soil blowing, a limited amount of water available to nonirrigated wheat in years of low precipitation, and the likelihood that frost will occur during any month of the growing season. Soil blowing can be controlled by returning crop residue to the soil and applying a system of conservation tillage. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Flood and sprinkler irrigation methods are suitable on this unit. The method used is governed by the crop that is grown. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage.

Few limitations affect the production of irrigated hay and pasture. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Flood and sprinkler irrigation methods are suitable on this unit. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the plants but also to the available water capacity and rate of water intake in the soil.

Few limitations affect range management. This unit responds well to range seeding and to proper grazing use. Mountain big sagebrush readily increases in abundance. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where sagebrush has increased in abundance, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly basin wildrye, bluebunch wheatgrass, Idaho fescue, Sandberg bluegrass, and mountain big sagebrush.

Few limitations affect the use of this unit for windbreaks and environmental plantings. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are Norway spruce, hybrid poplar, Russian-olive, and lilac.

This unit is in capability units IIIe-1, irrigated, and IVe-1, nonirrigated. It is in MLRA 21.

112—Dunnlake-Bucklake complex, 2 to 15 percent slopes. This map unit is on lava plateaus. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days.

This unit is about 50 percent Dunnlake soil and 40 percent Bucklake soil.

Included in this unit are small areas of Searles very stony loam, Orhood very cobbly loam, and Capona cobbly loam. Also included are small areas of Truax fine sandy loam and soils that have slopes of more than 15 percent. Included areas make up about 10 percent of the total acreage.

The Dunnlake soil is shallow and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 20 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown very stony loam about 4 inches thick. The upper 3 inches of the subsoil is grayish brown clay loam. The lower 9 inches is brown and yellowish brown gravelly clay. Hard bedrock is at a depth of about 16 inches.

Permeability is slow in the Dunnlake soil. Available water capacity is very low or low. The effective rooting depth is 12 to 20 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

The Bucklake soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, the surface layer is grayish brown very cobbly loam about 5 inches thick. The upper 13 inches of the subsoil is grayish brown and brown gravelly clay loam. The lower 12 inches is brown gravelly clay and gravelly clay loam. Hard bedrock is at a depth of about 30 inches. Cobbles and stones cover 15 to 30 percent of the surface.

Permeability is slow in the Bucklake soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

This unit is used as rangeland. The main concerns affecting range management are the surface stoniness on both soils and the depth to bedrock in the Bucklake soil. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage on the Dunnlake soil is limited by the shallow rooting depth. Building fences is difficult on this shallow soil. As a result, special design is needed. The potential plant community is mainly bluebunch wheatgrass, Thurber needlegrass, and low sagebrush on the Dunnlake soil and bluebunch wheatgrass, Thurber needlegrass, mountain big sagebrush, and antelope bitterbrush on the Bucklake soil.

The Dunnlake soil is in capability subclass VIIs, nonirrigated, and the Bucklake soil is in capability subclass VIs, nonirrigated. Both soils are in MLRA 21.

113—Dunnlake-Bucklake complex, 15 to 30 percent slopes. This map unit is on mountain side slopes. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days.

This unit is about 50 percent Dunnlake soil and 40 percent Bucklake soil.

Included in this unit are small areas of Truax fine sandy loam, Searles very stony loam, and Orhood very cobbly loam. Also included are small areas of Capona cobbly loam. Included areas make up about 10 percent of the total acreage.

The Dunnlake soil is shallow and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 30 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown very stony loam about 4 inches thick. The upper 3 inches of the subsoil is grayish brown clay loam. The lower 9 inches is brown and yellowish brown gravelly clay. Hard bedrock is at a depth of about 16 inches. Stones and cobbles cover 20 to 40 percent of the surface.

Permeability is slow in the Dunnlake soil. Available water capacity is very low or low. The effective rooting depth is 12 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Bucklake soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 2 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown loam about 10 inches thick. The upper 7 inches of the subsoil is brown clay loam. The lower 18 inches is brown clay and clay loam. Hard bedrock is at a depth of about 35 inches.

Permeability is slow in the Bucklake soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for rangeland and the production of western juniper.

The main concerns affecting range management on the Dunnlake soil are the surface stoniness and the restricted depth to bedrock. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage is limited by the shallow root zone. Building fences is difficult on this shallow soil. As a result, special design is needed.

Western juniper readily invades areas of this unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community on the Dunnlake soil is mainly bluebunch wheatgrass, Thurber needlegrass, and low sagebrush.

Where the Dunnlake soil has been invaded by western juniper, the mean site index is 21, on the basis of a 50-year site index. The soil can produce 671 cubic feet of wood per acre in a stand of trees that average 58 square feet in the basal area and 13.2 inches in diameter at breast height. The slope and the stoniness limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

Where the Bucklake soil supports western juniper, the mean site index is 25, on the basis of a 50-year site index. The soil can produce 836 cubic feet of wood per acre in a stand of trees that average 70 square feet in the basal area and 14.5 inches in diameter at breast height. The stones on the surface of the adjacent soils and the slope limit the accessibility for woodcutting and for other activities involving the use of equipment. Management practices that overcome these limitations generally are not feasible.

Where the woodland canopy is less than 40 percent, the Bucklake soil produces a limited grazeable

understory. The characteristic understory plant community on this soil is Idaho fescue, bluebunch wheatgrass, and rabbitbrush. Properly managing livestock grazing helps to control erosion.

The Dunnlake soil is in capability subclass VIIs, nonirrigated, and the Bucklake soil is in capability subclass VIs, nonirrigated. Both soils are in MLRA 21.

114—Dunnlake-Bucklake-Lequieu complex, 2 to 9 percent slopes. This map unit is on lava plateaus. The native vegetation is mainly perennial grasses, forbs, shrubs, and trees. Elevation is 4,200 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

This unit is about 50 percent Dunnlake very stony loam, 20 percent Bucklake loam, and 20 percent Lequieu very stony loam.

Included in this unit are small areas of Searles very stony loam, Orhood very cobbly loam, and Capona cobbly loam. Also included are small areas of Truax fine sandy loam. Included areas make up about 10 percent of the total acreage.

The Dunnlake soil is shallow and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 30 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown very stony loam about 4 inches thick. The upper 3 inches of the subsoil is grayish brown clay loam. The lower 9 inches is brown and yellowish brown gravelly clay. Hard bedrock is at a depth of about 16 inches. Stones and cobbles cover 25 to 35 percent of the surface.

Permeability is slow in the Dunnlake soil. Available water capacity is very low or low. The effective rooting depth is 12 to 20 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

The Bucklake soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 2 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown loam about 10 inches thick. The upper 7 inches of the subsoil is brown clay loam. The lower 18 inches is brown clay and clay loam. Hard bedrock is at a depth of about 35 inches.

Permeability is slow in the Bucklake soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

The Lequieu soil is very shallow and well drained. It formed in material weathered from basalt. Typically, about 40 percent of the surface is stones and cobbles. The surface layer is pale brown very stony loam about 3 inches thick. The underlying material to a depth of 8 inches is pale brown very cobbly loam. Hard bedrock is at a depth of about 8 inches.

Permeability is moderate in the Lequieu soil. Available water capacity is very low. The effective rooting depth is 6 to 10 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

This unit is used for rangeland and the production of western juniper.

The main concerns affecting range management on the Dunnlake and Lequieu soils are the surface stoniness and the restricted depth to bedrock. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage on the Dunnlake and Lequieu soils is limited by the shallow rooting depth. Building fences is difficult on these shallow soils. As a result, special design is needed.

Western juniper readily invades areas of the Dunnlake soil. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where western juniper has increased in abundance, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody shrubs than were evident in the potential plant community. The potential plant community is mainly bluebunch wheatgrass, Thurber needlegrass, and low sagebrush on the Dunnlake soil and bluebunch wheatgrass, Idaho fescue, and low sagebrush on the Lequieu soil.

Where the Dunnlake soil has been invaded by western juniper, the mean site index is 21, on the basis of a 50-year site index. The soil can produce 671 cubic feet of wood per acre in a stand of trees that average 58 square feet in the basal area and 13.2 inches in diameter at breast height. The stoniness limits the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

Where the Bucklake soil supports western juniper, the mean site index is 25, on the basis of a 50-year site index. The soil can produce 836 cubic feet of wood per acre in a stand of trees that average 70 square feet in the basal area and 14.5 inches in diameter at breast height. The stones on the surface of the adjacent soils limit the accessibility for woodcutting and other activities

involving the use of equipment. Management practices that overcome this limitation generally are not feasible.

Where the woodland canopy is less than 40 percent, the Bucklake soil produces a limited grazeable understory. The characteristic understory plant community on this soil is mainly bluebunch wheatgrass, rabbitbrush, and Idaho fescue. Properly managing livestock grazing helps to control erosion.

The Dunnlake and Lequieu soils are in capability subclass VIIs, nonirrigated, and the Bucklake soil is in capability subclass VIs, nonirrigated. All three of the soils are in MLRA 21.

115—Dunnlake-Lequieu complex, 2 to 9 percent slopes. This map unit is on lava plateaus. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,400 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days.

This unit is about 50 percent Dunnlake soil and 35 percent Lequieu soil.

Included in this unit are small areas of Searles very stony loam, Adieux sandy loam, and Lorella very stony loam. Also included, in the northwest corner of the survey area, are small areas of soils that are similar to the Dunnlake and Lequieu soils but receive more precipitation. Included areas make up about 15 percent of the total acreage.

The Dunnlake soil is shallow and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 20 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown very stony loam about 4 inches thick. The upper 3 inches of the subsoil is grayish brown clay loam. The lower 9 inches is brown and yellowish brown gravelly clay. Hard bedrock is at a depth of about 16 inches.

Permeability is slow in the Dunnlake soil. Available water capacity is very low or low. The effective rooting depth is 12 to 20 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

The Lequieu soil is very shallow and well drained. It formed in material weathered from basalt. Typically, about 40 percent of the surface is covered with stones and cobbles. The surface layer is pale brown very stony loam about 3 inches thick. The substratum is pale brown very cobbly loam about 5 inches thick. Hard bedrock is at a depth of about 8 inches.

Permeability is moderate in the Lequieu soil. Available water capacity is very low. The effective rooting depth is 6 to 10 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

This unit is used as rangeland. The main concerns affecting range management are the surface stoniness and the restricted depth to bedrock. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage on this unit is limited by the shallow rooting depth. Building fences is difficult on these shallow and very shallow soils. As a result, special design is needed.

Western juniper readily invades areas of the Dunnlake soil. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly bluebunch wheatgrass, Thurber needlegrass, and low sagebrush on the Dunnlake soil and bluebunch wheatgrass, Idaho fescue, and low sagebrush on the Lequieu soil (fig. 3).

Where the Dunnlake soil has been invaded by western juniper, the mean site index is 21, on the basis of a 50-year site index. The soil can produce 671 cubic feet of wood per acre in a stand of trees that average 58 square feet in the basal area and 13.2 inches in diameter at breast height. The stoniness limits the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

This unit is in capability subclass VIIs, nonirrigated, and in MLRA 21.

116—Dunnlake-Rangee complex, 0 to 5 percent slopes. This map unit is on basalt plateaus. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

This unit is about 50 percent Dunnlake soil and 40 percent Rangee soil.

Included in this unit are small areas of Lorella very stony loam and Lequieu very stony loam. Also included are small areas of soils that are similar to the Rangee soil but have bedrock at a depth of 40 to 60 inches and

Figure 3.—An area of Dunnlake-Lequieu complex, 2 to 9 percent slopes. Low sagebrush is the dominant brush species on this unit.

small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

The Dunnlake soil is shallow and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 2 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown loam about 4 inches thick. The upper 3 inches of the subsoil is grayish brown clay loam. The lower 9 inches is yellowish brown and brown clay. Hard bedrock is at a depth of about 16 inches. Stones and cobbles cover 0 to 3 percent of the surface.

Permeability is slow in the Dunnlake soil. Available water capacity is very low or low. The effective rooting depth is 12 to 20 inches. Runoff is slow, and the hazard of water erosion is slight.

The Rangee soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 2 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown sandy clay loam about 6 inches thick. The subsoil is grayish brown and brown clay about 18 inches thick. The next layer is a pink hardpan about 6 inches thick. Hard, fractured bedrock is at a depth of about 30 inches.

Permeability is very slow in the Rangee soil. Available water capacity is low or moderate. The

effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as rangeland. The main concerns affecting range management are the restricted depth to bedrock in the Dunnlake soil and the depth to a layer of clay in the Rangee soil. The production of forage is limited by the shallow rooting depth in the Dunnlake soil. Building fences is difficult on this shallow soil. As a result, special design is needed. The species that can withstand droughtiness should be selected for seeding. The potential plant community is mainly bluebunch wheatgrass, Thurber needlegrass, rabbitbrush, and low sagebrush.

The Dunnlake soil is in capability subclass VIIs, nonirrigated, and the Rangee soil is in capability subclass VIs, nonirrigated. Both soils are in MLRA 21.

117—Eastable loam, 0 to 5 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from lacustrine tuff and extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

Typically, the surface layer is light brownish gray loam about 4 inches thick. The subsoil is light brownish gray clay loam about 14 inches thick. The upper 17 inches of the substratum is pale brown loam. The lower part to a depth of 62 inches is very pale brown loam.

Included in this unit are small areas of Hedox loam. Also included are small areas of Capona cobbly loam, Dotta sandy loam, and soils that are similar to the Eastable soil but have soft bedrock at a depth of 40 to 60 inches. Included areas make up about 10 percent of the total acreage.

Permeability is moderately slow in the Eastable soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, irrigated hay and pasture, and rangeland.

Few limitations affect the use of this unit for irrigated wheat, barley, and oats. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Sprinkler irrigation is the best method of applying water.

Few limitations affect the production of irrigated hay and pasture. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Sprinkler irrigation is the best method of applying water. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the plants but also to the available water capacity and rate of water intake in the soil.

Few limitations affect range management. This unit responds well to range seeding and to proper grazing use. The potential plant community is mainly basin wildrye, Thurber needlegrass, rabbitbrush, and mountain big sagebrush.

Few limitations affect the use of this unit for windbreaks and environmental plantings. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are Norway spruce, Lombardy poplar, Russian-olive, and lilac.

This unit is in capability unit IIIe-1, irrigated, and capability subclass VIe, nonirrigated. It is in MLRA 21.

118—Eastable-Hedox complex, 2 to 9 percent slopes. This map unit is on hills and alluvial fans. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

This unit is about 45 percent Eastable soil and 40 percent Hedox soil. The Eastable soil is on alluvial fans, and the Hedox soil is on hills.

Included in this unit are small areas of soils that are similar to the Eastable soil but have a hardpan at a depth of 20 to 60 inches and small areas of Porterfield loam. Also included are small areas of soils that are similar to the Eastable soil but have bedrock at a depth of 40 to 60 inches. Included areas make up about 15 percent of the total acreage.

The Eastable soil is very deep and well drained. It formed in alluvium derived from tuff and extrusive igneous rock. Typically, the surface layer is light brownish gray loam about 4 inches thick. The subsoil is light brownish gray clay loam about 14 inches thick. The upper 17 inches of the substratum is pale brown loam. The lower part to a depth of 62 inches is very pale brown loam.

Permeability is moderately slow in the Eastable soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

The Hedox soil is moderately deep and well drained.

It formed in material weathered from diatomite and tuff. Typically, the surface layer is light gray and very pale brown loam about 8 inches thick. The upper 11 inches of the underlying material is pale brown loam. The lower 8 inches is very pale brown gravelly loam. Weathered bedrock is at a depth of about 27 inches.

Permeability is moderate in the Hedox soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

This unit is used mainly for cultivated crops, irrigated hay and pasture, and rangeland.

If this unit is used for irrigated wheat, barley, or oats, the main management concerns are the low or moderate available water capacity and restricted depth to bedrock in the Hedox soil. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Because the Hedox soil is droughty, applications of water should be light and frequent. Sprinkler irrigation is the best method of applying water.

If this unit is used for irrigated hay and pasture, the main management concerns are the low or moderate available water capacity and restricted depth to bedrock in the Hedox soil. Sprinkler irrigation is the best method of applying water. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the plants but also to the available water capacity and rate of water intake in the soil.

Few limitations affect range management. This unit responds well to range seeding and to proper grazing use. The Hedox soil is underlain by soft, fractured tuff and diatomite, which do not seriously limit the production of rangeland vegetation. The potential plant community is mainly basin wildrye, Thurber needlegrass, rabbitbrush, and mountain big sagebrush.

Few limitations affect the use of the Eastable soil for windbreaks and environmental plantings. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are Norway spruce, Lombardy poplar, Russian-olive, and lilac.

This unit is in capability unit IIIe-1, irrigated, and capability subclass VIe, nonirrigated. It is in MLRA 21.

119—Esro loam, 0 to 2 percent slopes. This very deep, very poorly drained soil is on low stream terraces. It formed in alluvium derived from extrusive igneous rock and volcanic ash. The native vegetation is mainly perennial grasses, sedges, and other water-tolerant plants. Elevation is 4,500 to 5,500 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 50 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown and dark grayish brown loam about 26 inches thick. The upper 14 inches of the underlying material is light gray silty clay loam. The lower part to a depth of 60 inches or more is light brownish gray, stratified sandy clay loam. In some areas the surface layer is clay loam.

Included in this unit are small areas of Orset sandy loam and soils that are similar to the Esro soil but have a hardpan at a depth of 30 to 45 inches. Included areas make up about 10 percent of the total acreage.

Permeability is moderately slow in the Esro soil. Available water capacity is high or very high. The effective rooting depth is 60 inches or more, but it is affected by the seasonal high water table, which is within a depth of 1 foot from December through August. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to frequent flooding from January through June.

This unit is used as rangeland. The main concerns affecting range management are the seasonal high water table and the hazard of flooding. The unit responds well to applications of fertilizer, to range seeding, and to proper grazing use. The species that can withstand flooding and a high water table should be selected for seeding. Livestock grazing is limited by the frequent flooding in winter and spring. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. The water table provides extra moisture for high forage production. The unit can provide green feed throughout the growing season. The potential plant community is mainly carex, rush, tufted hairgrass, clover, northern mannagrass, and willow.

This unit is in capability subclass Vw, nonirrigated, and in MLRA 22.

120—Esro loam, drained, 0 to 2 percent slopes. This very deep, very poorly drained soil is on low stream terraces. It formed in alluvium derived from extrusive igneous rock and volcanic ash. The native vegetation is mainly perennial grasses, sedges, and other water-tolerant plants. Elevation is 4,500 to 5,500 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 50 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown and dark grayish brown loam about 26 inches thick. The upper 14 inches of the underlying material is light gray silty clay loam. The lower part to a depth of 60 inches or

more is light brownish gray, stratified sandy clay loam. In some areas the surface layer is clay loam.

Included in this unit are small areas of Orset sandy loam and soils that are similar to the Esro soil but have a hardpan at a depth of 40 to 60 inches. Included areas make up about 10 percent of the total acreage.

Permeability is moderately slow in the Esro soil. Available water capacity is high or very high. The effective rooting depth is 60 inches or more, but it is affected by the seasonal high water table, which is at a depth of 2 to 4 feet from December through July. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to rare flooding.

This unit is used as rangeland. The main concern affecting range management is the seasonal high water table. The unit responds well to applications of fertilizer, to range seeding, and to proper grazing use. The species that can withstand wetness should be selected for seeding. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. The water table provides extra moisture for high forage production. The unit can provide green feed throughout the growing season. The potential plant community is mainly carex, clover, tufted hairgrass, Kentucky bluegrass, Sandberg bluegrass, and willow.

This unit is in capability unit IVw-2, nonirrigated, and in MLRA 22.

121—Forbar fine sand, 0 to 2 percent slopes. This very deep, artificially drained soil is in lake basins. It formed in very poorly drained alluvium derived from lacustrine sediment and tuff. It is protected from flooding by dikes and levees. Pumps and open drainage ditches are used to lower the water table and alter the drainage of the soil. The native vegetation is mainly perennial grasses and forbs. Elevation is 4,075 to 4,090 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

Typically, the surface layer is about 7 inches of light brownish gray fine sand that has prominent, strong brown mottles. The upper 36 inches of the substratum is light yellowish brown fine sand that has distinct, yellowish red mottles. The lower part to a depth of 60 inches or more is gray fine sand. In some areas the surface layer is sandy loam.

Included in this unit are small areas of Capjac silt loam and Lamath silt loam. Also included are small areas of soils that are similar to the Forbar soil but have a surface layer of silt loam 2 to 5 inches thick. Included areas make up about 10 percent of the total acreage.

Permeability is rapid in the Forbar soil. Available water capacity is low. The effective rooting depth is 60 inches or more, but it is affected by the water table, which is maintained at a depth of 1.5 to 3.0 feet throughout the year. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to rare flooding.

This unit is used mainly for wildlife habitat. It is frequented by migratory waterfowl. It provides food and cover for such wildlife species as ducks, geese, ring-necked pheasants, and birds of prey. Developing shallow water areas can improve the habitat for waterfowl.

This unit is in capability subclass Vw, nonirrigated, and in MLRA 21.

122—Fordney loamy fine sand, 0 to 2 percent slopes. This very deep, excessively drained soil is on terraces. It formed in alluvial and lacustrine sediment derived from tuff. The native vegetation is mainly perennial grasses, shrubs, and forbs. Elevation is 4,050 to 4,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 50 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown loamy fine sand about 9 inches thick. The substratum to a depth of 60 inches or more is grayish brown and brown loamy sand. In some areas the surface layer is loamy sand or sandy loam.

Included in this unit are small areas of Rojo sandy loam and Dehill fine sandy loam. Also included are small areas of Poman loamy sand and soils that are similar to the Fordney soil but have slopes of more than 2 percent. Included areas make up about 10 percent of the total acreage.

Permeability is rapid in the Fordney soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are a rapid rate of water intake, the hazard of soil blowing, and the likelihood that frost will occur during any month of the growing season. Because the rate of water intake is rapid, sprinkler irrigation is the best method of applying water. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Soil blowing can be controlled by returning crop residue to the soil and applying a system of conservation tillage.

Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage.

If this unit is used for irrigated hay and pasture, the main management concern is the rapid rate of water intake. Irrigation water should be applied at a rate that ensures optimum production without increasing the risk of deep percolation. Proper stocking rates, pasture rotation, and restricted grazing during dry periods help to keep the pasture in good condition and control erosion. Sprinkler irrigation is the best method of applying water.

The main concerns affecting range management are the hazard of soil blowing and the sandy texture. Seeding disturbed areas to native or tame pasture plants helps to control soil blowing. The sandy texture reduces the amount of water available to plants. The species that can withstand droughtiness should be selected for seeding. The potential plant community is mainly needleandthread, Indian ricegrass, antelope bitterbrush, and Wyoming big sagebrush.

If this unit is used for windbreaks and environmental plantings, the main management concern is droughtiness. The droughtiness of the surface layer increases the seedling mortality rate. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are ponderosa pine, black locust, Russian-olive, and multiflora rose.

If this unit is used for homesite development, the main management concerns are the hazards of ground-water contamination and soil blowing. If the density of housing is moderate or high, community sewage systems are needed to prevent the contamination of water supplies caused by seepage from onsite sewage disposal systems. Revegetating as soon as possible in disturbed areas around construction sites helps to control soil blowing. Mulch, applications of fertilizer, and irrigation are needed where lawn grasses and other small-seeded plants are becoming established.

This unit is in capability subclasses IIIe, irrigated, and VIe, nonirrigated. It is in MLRA 21.

123—Fordney loamy fine sand, 5 to 15 percent slopes. This very deep, excessively drained soil is on terraces. It formed in alluvial and lacustrine sediment derived from tuff. The native vegetation is mainly perennial grasses, shrubs, and forbs. Elevation is 4,050 to 4,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 50 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown loamy fine sand about 9 inches thick. The substratum to a depth of 60 inches or more is grayish brown and brown loamy sand.

Included in this unit are small areas of Rojo sandy loam, Poman loamy sand, and Searles very stony loam. Included areas make up about 5 percent of the total acreage.

Permeability is rapid in the Fordney soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

This unit is used as rangeland. The main concerns affecting range management are the hazard of soil blowing and the sandy texture. Seeding disturbed areas to native or tame pasture plants helps to control soil blowing. The sandy texture reduces the amount of water available to plants. The species that can withstand droughtiness should be selected for seeding. The potential plant community is mainly needleandthread, Indian ricegrass, antelope bitterbrush, and Wyoming big sagebrush.

If this unit is used for windbreaks and environmental plantings, the main management concern is droughtiness. The droughtiness of the surface layer increases the seedling mortality rate. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are ponderosa pine, black locust, Russian-olive, and multiflora rose.

This unit is in capability subclass VIe, nonirrigated, and in MLRA 21.

124—Fordney loamy fine sand, slightly wet, 0 to 2 percent slopes. This very deep, artificially drained soil is on terraces. It formed in excessively drained alluvial and lacustrine sediment derived from tuff. The water table is controlled by pumping from deep lateral drains. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,050 to 4,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 50 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown loamy fine sand about 9 inches thick. The substratum to a depth of 60 inches or more is grayish brown and brown loamy sand.

Included in this unit are small areas of Leavers sandy loam, Capjac silt loam, and Lamath silt loam. Included areas make up about 5 percent of the total acreage.

Permeability is rapid in the Fordney soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more, but it is affected by the water

table, which is maintained at a depth of 2 to 6 feet from March through September. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

This unit is used for cultivated crops or hay and pasture.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are a rapid rate of water intake, the low available water capacity, the hazard of soil blowing, and the likelihood that frost will occur during any month of the growing season. Because the rate of water intake is rapid, sprinkler irrigation is the best method of applying water. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Soil blowing can be controlled by returning crop residue to the soil and minimizing tillage. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage.

If this unit is used for hay and pasture, the main management concern is the depth to a seasonal high water table. The water table builds up during the growing season and thus generally limits the suitability for deep-rooted crops. Tile drainage can be used to lower the water table if a suitable outlet is available. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage.

If this unit is used for windbreaks and environmental plantings, the main management concern is droughtiness. The droughtiness of the surface layer increases the seedling mortality rate. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are Scotch pine, Siberian elm, Russian-olive, and multiflora rose.

This unit is in capability unit IIIw-1, irrigated, and in MLRA 21.

125—Fredonyer-Mahogan complex, 30 to 50 percent slopes. This map unit is on mountains. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 5,200 to 6,210 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 60 days. Frost can occur during any month of the year.

This unit is about 50 percent Fredonyer very stony loam and 40 percent Mahogan loam.

Included in this unit are small areas of Pinehurst stony loam and soils that are similar to the Mahogan soil but are more than 40 inches deep over bedrock. Also included are small areas of soils that are similar to the Fredonyer soil but have less than 35 percent rock fragments. Included areas make up about 10 percent of the total acreage.

The Fredonyer soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 40 percent of the surface is covered with stones and cobbles. The surface layer is dark grayish brown very stony loam about 10 inches thick. The subsoil is grayish brown very cobbly loam about 15 inches thick. Hard, extrusive igneous bedrock is at a depth of about 25 inches.

Permeability is moderate in the Fredonyer soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Mahogan soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, the surface layer is grayish brown loam about 13 inches thick. The upper 13 inches of the subsoil is brown gravelly loam. The lower 12 inches is brown gravelly sandy clay loam. Hard, extrusive igneous bedrock is at a depth of about 38 inches.

Permeability is moderate in the Mahogan soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used as rangeland. The main concerns affecting range management are the slope of both of the soils and the stones on and in the Fredonyer soil. The slope limits access by livestock and can result in overgrazing of the less sloping areas. Livestock distribution can be improved by properly located fences and livestock watering facilities. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods.

Western juniper readily invades areas of the Fredonyer soil. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly Idaho fescue, mountain big sagebrush, bluebunch wheatgrass, and curlleaf mountainmahogany on the Fredonyer soil and Idaho fescue, bluebunch wheatgrass, Nevada bluegrass, curlleaf

mountainmahogany, and mountain big sagebrush on the Mahogan soil.

Where the Fredonyer soil has been invaded by western juniper, the mean site index is 21, based on a 50-year site index. The Fredonyer soil can produce 690 cubic feet of wood per acre in a stand of trees that average 63 square feet in the basal area and 12.9 inches in diameter at breast height. The slope and the stoniness limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

This unit is in capability subclass VIe, nonirrigated, and in MLRA 21.

126—Fredonyer-Rock outcrop complex, 30 to 50 percent slopes. This map unit is on mountains. The native vegetation is mainly perennial grasses, forbs, shrubs, and trees. Elevation is 5,200 to 6,518 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 60 days.

This unit is about 45 percent Fredonyer very stony loam and 40 percent Rock outcrop.

Included in this unit are small areas of Demox stony sandy loam. Also included are small areas of soils that are similar to the Fredonyer soil but are less than 20 inches deep over bedrock. Included areas make up about 15 percent of the total acreage.

The Fredonyer soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 40 percent of the surface is covered with stones and cobbles. The surface layer is dark grayish brown very stony loam about 10 inches thick. The subsoil is grayish brown very cobbly loam about 15 inches thick. Hard, extrusive igneous bedrock is at a depth of about 25 inches.

Permeability is moderate in the Fredonyer soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is medium or rapid, and the hazard of water erosion is severe.

Rock outcrop occurs as areas of exposed bedrock. Most areas are barren, but some support a few grasses and brush, which grow between the rocks.

This unit is used as rangeland. The main concerns affecting range management on the Fredonyer soil are the slope and the stones on and below the surface. The slope limits access by livestock and can result in overgrazing of the less sloping areas. Livestock distribution can be improved by properly located fences and livestock watering facilities. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods.

Western juniper readily invades areas of this unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community on the Fredonyer soil is mainly Idaho fescue, bluebunch wheatgrass, mountain big sagebrush, and curlleaf mountainmahogany.

Where the Fredonyer soil has been invaded by western juniper, the mean site index is 21, on the basis of a 50-year site index. The soil can produce 690 cubic feet of wood per acre in a stand of trees that average 63 square feet in the basal area and 12.9 inches in diameter at breast height. The slope and the stoniness limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

The Fredonyer soil is in capability subclass VIs, nonirrigated, and the Rock outcrop is in capability class VIII. Both are in MLRA 21.

127—Hedox-Porterfield complex, 5 to 15 percent slopes. This map unit is on hills and the side slopes of plateaus. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days.

This unit is about 55 percent Hedox soil and 35 percent Porterfield soil.

Included in this unit are small areas of Eastable loam and Stukel sandy loam. Also included are small areas of soils that are similar to the Hedox soil but have bedrock at a depth of 40 to 60 inches. Included areas make up about 10 percent of the total acreage.

The Hedox soil is moderately deep and well drained. It formed in material weathered from diatomite and tuff. Typically, the surface layer is light gray and very pale brown loam about 8 inches thick. The upper 11 inches of the underlying material is pale brown loam. The lower 8 inches is very pale brown gravelly loam. Weathered bedrock is at a depth of about 27 inches.

Permeability is moderate in the Hedox soil. Available water capacity is low or moderate. The effective rooting

depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Porterfield soil is shallow and well drained. It formed in material weathered from diatomite and tuff. Typically, the surface layer is light gray loam about 6 inches thick. The upper 7 inches of the underlying material is very pale brown loam. The lower 2 inches is very pale brown very gravelly loam. Weathered bedrock is at a depth of about 15 inches.

Permeability is moderate in the Porterfield soil. Available water capacity is very low or low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for hay, pasture, and rangeland.

If this unit is used for irrigated hay or dryland pasture, the main limitations are the restricted depth to bedrock and the very low to moderate available water capacity. Sprinkler irrigation is the best method of applying water. Because the soils are droughty, applications of water should be light and frequent.

Few limitations affect range management. The soils are underlain by soft, fractured tuff and diatomite, which do not limit the production of rangeland vegetation. The potential plant community is mainly basin wildrye, bluebunch wheatgrass, mountain big sagebrush, and rabbitbrush.

The Hedox soil is in capability unit IIIe-1, irrigated, and in capability subclass VIe, nonirrigated. The Porterfield soil is in capability unit IVe-1, irrigated, and in capability subclass VIe, nonirrigated. Both soils are in MLRA 21.

128—Hedox-Porterfield complex, 15 to 30 percent slopes. This map unit is on hills and the side slopes of plateaus. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

This unit is about 50 percent Hedox soil and 35 percent Porterfield soil.

Included in this unit are areas of Eastable loam and Rock outcrop. Also included are small areas of soils that are similar to the Hedox soil but have stones and boulders on the surface. Included areas make up about 15 percent of the total acreage.

The Hedox soil is moderately deep and well drained. It formed in material weathered from diatomite and tuff. Typically, the surface layer is light gray and very pale brown loam about 8 inches thick. The upper 11 inches of the underlying material is pale brown loam. The lower 8 inches is very pale brown gravelly loam. Weathered bedrock is at a depth of about 27 inches.

Permeability is moderate in the Hedox soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Porterfield soil is shallow and well drained. It formed in material weathered from diatomite and tuff. Typically, the surface layer is light gray loam about 6 inches thick. The upper 7 inches of the underlying material is very pale brown loam. The lower 2 inches is very pale brown very gravelly loam. Weathered bedrock is at a depth of about 15 inches.

Permeability is moderate in the Porterfield soil. Available water capacity is very low or low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland. Few limitations affect range management. The Hedox and Porterfield soils are underlain by soft, fractured tuff and diatomite, which do not seriously limit the production of rangeland vegetation. Western juniper readily invades areas of these soils. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly basin wildrye, bluebunch wheatgrass, mountain big sagebrush, and rabbitbrush.

Where this unit has been invaded by western juniper, the site index is 28 on the Hedox soil and 23 on the Porterfield soil, on the basis of a 50-year site index. The Hedox soil can produce 611 cubic feet of wood per acre in a stand of trees that average 50 square feet in the basal area and 14 inches in diameter at breast height. The Porterfield soil can produce 412 cubic feet of wood per acre in a stand of trees that average 38 square feet in the basal area and 12 inches in diameter at breast height. The slope limits the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

This unit is in capability subclass VIe, nonirrigated, and in MLRA 21.

129—Hedox-Porterfield complex, stony, 15 to 30 percent slopes. This map unit is on the side slopes of plateaus. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48

degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

This unit is about 50 percent Hedox soil and 35 percent Porterfield soil.

Included in this unit are small areas of Hedox loam, Porterfield loam, and Rock outcrop. Also included are small areas of soils that are similar to the Hedox soil but are more than 40 inches deep over bedrock. Included areas make up about 15 percent of the total acreage.

The Hedox soil is moderately deep and well drained. It formed in material weathered from diatomite and tuff. Typically, about 13 percent of the surface is covered with stones and cobbles. The surface layer is light gray and very pale brown stony loam about 8 inches thick. The upper 11 inches of the underlying material is pale brown stony loam. The lower 8 inches is very pale brown gravelly loam. Weathered bedrock is at a depth of about 27 inches.

Permeability is moderate in the Hedox soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Porterfield soil is shallow and well drained. It formed in material weathered from diatomite and tuff. Typically, about 13 percent of the surface is covered with stones, cobbles, and boulders. The surface layer is light gray stony loam about 4 inches thick. The upper 9 inches of the underlying material is very pale brown gravelly loam. The lower 2 inches is very pale brown very gravelly loam. Weathered bedrock is at a depth of about 15 inches.

Permeability is moderate in the Porterfield soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used as rangeland. The main concern affecting range management is the surface stoniness. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The soils are underlain by soft, fractured tuff and diatomite, which do not seriously limit the production of rangeland vegetation. The potential plant community is mainly basin wildrye, bluebunch wheatgrass, mountain big sagebrush, and rabbitbrush.

This unit is in capability subclass VIe, nonirrigated, and in MLRA 21.

130—Inlow-Modoc complex, 0 to 2 percent slopes. This map unit is on lake terraces. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,300 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 50 days. Frost can occur during any month of the year.

This unit is about 50 percent Inlow silt loam and 35 percent Modoc loam. The Inlow soil is on low mounds, and the Modoc soil is on high mounds.

Included in this unit are small areas of Ocho very fine sandy loam, Poman loamy sand, and soils that are similar to the Modoc soil but are more than 40 inches deep to a hardpan. Included areas make up about 15 percent of the total acreage.

The Inlow soil is moderately deep and moderately well drained. It formed in lacustrine deposits and alluvium derived from volcanic ash and extrusive igneous rock. Typically, the surface layer is light gray and light brownish gray silt loam about 13 inches thick. The subsoil is about 20 inches of light gray, very slightly saline, sodic silt loam and loam. The next layer is a very pale brown hardpan about 26 inches thick. The underlying material to a depth of 69 inches is light gray, very slightly saline, sodic loamy fine sand.

Permeability is slow in the Inlow soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. The seasonal high water table is at a depth of 3 to 6 feet from January through March.

The Modoc soil is moderately deep and well drained. It formed in lacustrine sediment and alluvium derived from basalt, andesite, diatomite, and pyroclastic rock. Typically, the surface layer is grayish brown loam about 12 inches thick. The upper 9 inches of the subsoil is light brownish gray loam. The lower 13 inches is pale brown sandy clay loam. The next layer is a light gray hardpan about 21 inches thick. The substratum to a depth of 60 inches or more is light gray, stratified sandy loam.

Permeability is moderately slow in the Modoc soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as mainly as rangeland. A few small areas are used for cultivated crops.

The main concerns affecting range management on the Inlow soil are the hazard of soil blowing and the sodicity. Soil properties seldom limit range management on the Modoc soil. Seeding disturbed areas to native or tame pasture plants helps to control soil blowing. The production of forage on the Inlow soil is limited by sodicity. Management practices that overcome this limitation generally are not feasible. The species that can withstand sodicity should be selected for seeding.

Black greasewood readily increases in abundance on

the Inlow soil, and basin big sagebrush readily increases in abundance on the Modoc soil. Brush competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where brush has increased in abundance, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly basin wildrye, saltgrass, black greasewood, spiny hopsage, and rabbitbrush on the Inlow soil and basin wildrye, beardless wildrye, and basin big sagebrush on the Modoc soil.

If this unit is used for irrigated barley, the main management concerns are the content of salts and sodium in the Inlow soil. There are few limitations in areas of the Modoc soil. Management practices that overcome the saline-sodic condition generally are not feasible. This condition can inhibit the growth of crops. Sprinkler irrigation is the best method of applying water. Because the content of salts and sodium results in slow permeability in the Inlow soil, the application rate should be regulated so that water does not stand on the surface and damage the crops.

If this unit is used for windbreaks and environmental plantings, the main management concerns are the concentration of toxic salts in the Inlow soil and the restricted depth to a hardpan in the Modoc soil. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. In leveled areas that are used for cultivated crops or for hay and pasture, the windbreak species selected for planting should be those that are suited to the Inlow soil. Examples of suitable plants are Scotch pine, Siberian elm, Russian-olive, and multiflora rose on the Inlow soil and ponderosa pine, black locust, American plum, and Tatarian honeysuckle on the Modoc soil.

The Inlow soil is in capability unit IVs-6, irrigated, and capability subclass VIs, nonirrigated. The Modoc soil is in capability unit IIIs-6, irrigated, and capability subclass VIs, nonirrigated. Both soils are in MLRA 21.

131—Inlow-Ocho complex, 0 to 2 percent slopes. This map unit is on lake terraces. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,300 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 50 days. Frost can occur during any month of the year.

This unit is about 55 percent Inlow soil and 35 percent Ocho soil. The Inlow soil is on low mounds, and the Ocho soil is in areas between the mounds.

Included in this unit are small areas of Modoc loam and Poman loamy sand. Included areas make up about 10 percent of the total acreage.

The Inlow soil is moderately deep and moderately well drained. It formed in lacustrine deposits and alluvium derived from volcanic ash and extrusive igneous rock. Typically, the surface layer is light gray and light brownish gray silt loam about 13 inches thick. The subsoil is about 20 inches of light gray, very slightly saline, sodic silt loam and loam. The next layer is a very pale brown hardpan about 26 inches thick. The underlying material to a depth of 69 inches is light gray, very slightly saline, sodic loamy fine sand.

Permeability is slow in the Inlow soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. The seasonal high water table is at a depth of 3 to 6 feet from January through March.

The Ocho soil is shallow and somewhat poorly drained. It formed in lacustrine deposits and alluvium derived from volcanic ash and extrusive igneous rock. Typically, the surface layer is light brownish gray and light gray very fine sandy loam about 9 inches thick. The subsoil is light brown, sodic loam about 7 inches thick. The next layer is a pale brown and light gray hardpan about 18 inches thick. The upper 6 inches of the substratum is light gray silt loam, the next 9 inches is light brownish gray very fine sandy loam, and the lower part to a depth of 60 inches or more is light brownish gray and light gray loamy sand.

Permeability is slow in the Ocho soil. Available water capacity is very low or low. The effective rooting depth is 14 to 20 inches. Runoff is ponded, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. The seasonal high water table fluctuates between 0.5 foot above and 1.0 foot below the surface from December through March.

This unit is used mainly as rangeland. A few small areas are used for cultivated crops.

The main concerns affecting range management on the Inlow soil are the hazard of soil blowing and the sodicity. The main concerns affecting range management on the Ocho soil are the hazard of soil blowing, the sodicity, the shallow rooting depth, and surface crusting. The production of forage on this unit is limited by the sodicity and the shallow rooting depth. Management practices that overcome the sodicity generally are not feasible. Seeding generally is not feasible. Surface crusting inhibits the infiltration of water.

Black greasewood readily increases in abundance on

the Inlow soil. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where black greasewood has increased in abundance, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly basin wildrye, saltgrass, rabbitbrush, black greasewood, and spiny hopsage on the Inlow soil and annual hairgrass, saltgrass, black greasewood, and clasping pepperweed on the Ocho soil.

This unit is very poorly suited to irrigated barley. The main management concerns are the content of salts and sodium in the Inlow soil and the content of salts and sodium, hazard of ponding, and depth to a hardpan in the Ocho soil. Management practices that overcome these limitations generally are not feasible. The saline-sodic condition can inhibit the growth of crops. Sprinkler irrigation is the best method of applying water. Because the saline-sodic condition results in slow permeability in these soils, the application rate should be regulated so that water does not stand on the surface and damage the crops.

If the Inlow soil is used for windbreaks and environmental plantings, the main management concerns are the concentration of toxic salts and the restricted depth to a hardpan. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. The trees and shrubs selected for planting should be those that can withstand toxicity. Examples are Scotch pine, Siberian elm, Russian-olive, and multiflora rose.

The Inlow soil is in capability unit IVs-6, irrigated, and capability subclass VIs, nonirrigated. The Ocho soil is in capability subclasses VIs, irrigated, and VIIs, nonirrigated. Both soils are in MLRA 21.

132—Inlow-Ocho-Modoc complex, 0 to 2 percent slopes. This map unit is on lake terraces. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,300 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 50 days. Frost can occur during any month of the year.

This unit is about 35 percent Inlow silt loam, 30 percent Ocho very fine sandy loam, and 25 percent Modoc loam. The Inlow soil is on low mounds, the Modoc soil is on high mounds, and the Ocho soil is in areas between the mounds.

Included in this unit are small areas of Poman loamy sand and soils that are similar to the Modoc soil but are more than 40 inches deep to a hardpan. Included areas make up about 10 percent of the total acreage.

The Inlow soil is moderately deep and moderately well drained. It formed in lacustrine deposits and alluvium derived from volcanic ash and extrusive igneous rock. Typically, the surface layer is light gray and light brownish gray silt loam about 13 inches thick. The subsoil is about 20 inches of light gray, very slightly saline, sodic silt loam and loam. The next layer is a very pale brown hardpan about 26 inches thick. The underlying material to a depth of 69 inches is light gray, very slightly saline, sodic loamy fine sand.

Permeability is slow in the Inlow soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. The seasonal high water table is at a depth of 3 to 6 feet from January through March.

The Ocho soil is shallow and somewhat poorly drained. It formed in lacustrine deposits and alluvium derived from volcanic ash and extrusive igneous rock. Typically, the surface layer is light brownish gray and light gray very fine sandy loam about 9 inches thick. The subsoil is light brown, sodic loam about 7 inches thick. The next layer is a pale brown and light gray hardpan about 18 inches thick. The upper 6 inches of the substratum is light gray silt loam, the next 9 inches is light brownish gray very fine sandy loam, and the lower part to a depth of 60 inches or more is light brownish gray and light gray loamy sand.

Permeability is slow in the Ocho soil. Available water capacity is very low or low. The effective rooting depth is 14 to 20 inches. Runoff is ponded, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. The seasonal high water table fluctuates between 0.5 foot above and 1.0 foot below the surface from December through March.

The Modoc soil is moderately deep and well drained. It formed in lacustrine sediment and alluvium derived from basalt, andesite, diatomite, and pyroclastic rock. Typically, the surface layer is grayish brown loam about 12 inches thick. The upper 9 inches of the subsoil is light brownish gray loam. The lower 13 inches is pale brown sandy clay loam. The next layer is a light gray hardpan about 21 inches thick. The substratum to a depth of 60 inches or more is light gray, stratified sandy loam to gravelly sand.

Permeability is moderately slow in the Modoc soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. A few small areas are used for cultivated crops.

The main concerns affecting range management on the Inlow soil are the hazard of soil blowing and the sodicity. The main concerns affecting range management on the Ocho soil are the hazard of soil blowing, the sodicity, the shallow rooting depth, and surface crusting. Soil properties seldom limit range management on the Modoc soil. The production of forage is limited by the sodicity of the Inlow and Ocho soils and the shallow rooting depth in the Ocho soil. Management practices that overcome the sodicity generally are not feasible. The species that can withstand sodicity should be selected for seeding. Surface crusting inhibits the infiltration of water.

Black greasewood readily increases in abundance on the Inlow soil, and basin big sagebrush readily increases in abundance on the Modoc soil. Brush competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where brush has increased in abundance, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly basin wildrye, saltgrass, rabbitbrush, black greasewood, and spiny hopsage on the Inlow soil; annual hairgrass, saltgrass, black greasewood, and clasping pepperweed on the Ocho soil; and basin wildrye, beardless wildrye, and basin big sagebrush on the Modoc soil.

This unit is poorly suited to irrigated barley. The main management concerns are the content of salts and sodium in the Inlow soil and the content of salts and sodium, hazard of ponding, and depth to a hardpan in the Ocho soil. Management practices that overcome these limitations generally are not feasible. There are few management concerns in areas of the Modoc soil. The saline-sodic condition can inhibit the growth of crops. Sprinkler irrigation is the best method of applying water. Because the saline-sodic condition results in slow permeability in the Inlow and Ocho soils, the application rate should be regulated so that water does not stand on the surface and damage the crops.

If this unit is used for windbreaks and environmental plantings, the main management concerns are the concentration of toxic salts in the Inlow soil and the depth to a hardpan in the Modoc soil. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. In leveled areas that are used for cultivated crops or for hay and pasture, the windbreak species selected for planting should be those that are suited to the Inlow soil. Examples of suitable plants are Scotch pine, Siberian elm, Russian-olive, and multiflora rose on the Inlow soil and ponderosa pine, black locust, American plum, and Tatarian honeysuckle on the Modoc soil.

The Inlow soil is in capability unit IVs-6, irrigated, and capability subclass VIs, nonirrigated. The Ocho soil is in capability subclasses VIs, irrigated, and VIIs, nonirrigated. The Modoc soil is in capability unit IIIs-8, irrigated, and capability subclass VIs, nonirrigated. All three of the soils are in MLRA 21.

133—Kalo stony sandy loam, 5 to 30 percent slopes. This moderately deep, well drained soil is on mountains. It formed in material weathered from extrusive igneous rock. The native vegetation is mainly mixed conifers, perennial grasses, forbs, and shrubs. Elevation is 4,400 to 6,500 feet. The average annual precipitation is about 25 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. Also, about 10 percent of the surface is covered with stones and cobbles. The surface layer is brown stony sandy loam about 5 inches thick. The upper 6 inches of the subsoil is brown very cobbly loam. The lower 16 inches is brown very cobbly clay loam. Hard bedrock is at a depth of about 27 inches.

Included in this unit are small areas of Dunnlake and Lequieu very stony loams, Mojo stony loam, Searles very stony loam, and Pinehurst soils. Included areas make up about 15 percent of the total acreage.

Permeability is moderately slow in the Kalo soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is medium or rapid, and the hazard of water erosion is moderate or severe.

This unit is used for woodland and livestock grazing.

Ponderosa pine, Douglas-fir, incense cedar, and white fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index is 71 for ponderosa pine and 80 for Douglas-fir. The potential annual production of ponderosa pine is about 26 cubic feet, or 138 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees. The potential annual production of Douglas-fir is about 18 cubic feet, or 96 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees.

Seedling mortality and plant competition are the main concerns affecting timber production. Proper site preparation controls initial plant competition, and spraying controls the subsequent growth of competing

plants. Unless the site is adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. The low or very low available water capacity generally reduces the seedling survival rate in areas where understory plants are numerous. Examples of suitable trees are ponderosa pine and Douglas-fir.

Where this unit is used for livestock grazing, the forest canopy is less than 40 percent. The characteristic understory plant community is mainly manzanita, squawcarpet, bottlebrush squirreltail, and Nevada bluegrass.

This unit is in capability subclass VIe, nonirrigated, and in MLRA 22.

134—Kalo very stony sandy loam, 30 to 50 percent slopes. This moderately deep, well drained soil is on mountains. It formed in material weathered from extrusive igneous rock. The native vegetation is mainly mixed conifers, perennial grasses, forbs, and shrubs. Elevation is 4,400 to 6,500 feet. The average annual precipitation is about 25 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, about 30 percent of the surface is covered with stones and cobbles. The surface layer is brown very stony sandy loam about 5 inches thick. The upper 6 inches of the subsoil is brown very cobbly loam. The lower 16 inches is brown very cobbly clay loam. Hard bedrock is at a depth of about 27 inches. Stones and cobbles cover 25 to 35 percent of the surface.

Included in this unit are small areas of Mojo stony loam, Sheld stony sandy loam, and Pinehurst stony sandy loam. Included areas make up about 15 percent of the total acreage.

Permeability is moderately slow in the Kalo soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for woodland and livestock grazing.

Ponderosa pine, Douglas-fir, incense cedar, and white fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index is 71 for ponderosa pine and 80 for Douglas-fir. The potential annual production of ponderosa pine is about 26 cubic feet, or 138 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees. The potential annual production of Douglas-fir is about 18 cubic feet, or 96 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees.

The hazard of erosion, equipment limitation, seedling mortality, and plant competition are the main concerns affecting timber production. Conventional methods of harvesting timber can be used. Properly designed road drainage systems and carefully located culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding areas that have been cut and filled.

Proper site preparation controls initial plant competition, and spraying controls the subsequent growth of competing plants. Unless the site is adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. The very low or low available water capacity generally reduces the seedling survival rate in areas where understory plants are numerous. Examples of suitable trees are ponderosa pine and Douglas-fir.

Where this unit is used for livestock grazing, the forest canopy is less than 40 percent. The characteristic understory plant community is mainly manzanita, squawcarpet, bottlebrush squirreltail, and Nevada bluegrass.

This unit is in capability subclass VIe, nonirrigated, and in MLRA 22.

135—Karoc-Rock outcrop complex, 50 to 75 percent slopes. This map unit is on colluvial side slopes. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,050 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

This unit is about 65 percent Karoc soil and 25 percent Rock outcrop.

Included in this unit are small areas of soils that are similar to the Karoc soil but are underlain by bedrock at a depth of 10 to 20 inches or have slopes of less than 50 percent. Included areas make up about 10 percent of the total acreage.

The Karoc soil is very deep and well drained. It formed in colluvium derived from tuff and andesite. Typically, about 7 percent of the surface is covered with cobbles. The surface layer is dark grayish brown very gravelly sandy loam about 3 inches thick. The upper 10 inches of the substratum is pale brown very gravelly sandy loam. The lower part to a depth of 62 inches is pale brown very gravelly sandy loam. In some areas the surface layer is stony sandy loam.

Permeability is moderately rapid in the Karoc soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe.

Rock outcrop occurs as areas of exposed bedrock.

Most areas are barren, but some support a few grasses and brush, which grow between the rocks.

This unit is used mainly for wildlife habitat. It also is used as rangeland.

This unit provides habitat for such wildlife species as mule deer, coyotes, marmots, quail, jackrabbits, cliff-nesting birds, and birds of prey.

The main concern affecting range management is the slope. The slope limits access by livestock and can result in overgrazing of the less sloping areas. Livestock distribution can be improved by properly located fences and livestock watering facilities. The potential plant community is mainly bluebunch wheatgrass, Thurber needlegrass, and mountain big sagebrush.

The Karoc soil is in capability subclass VIIe, nonirrigated, and the Rock outcrop is in capability class VIII. Both are in MLRA 21.

136—Laki fine sandy loam, 0 to 2 percent slopes. This very deep, artificially drained soil is on terraces. The water table is controlled by pumping from deep lateral drains. The soil formed in moderately well drained alluvium and lacustrine sediment derived from basalt, tuff, diatomite, and volcanic ash. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,035 to 4,050 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown, slightly saline, sodic fine sandy loam about 12 inches thick. The subsoil is light brownish gray and light gray, slightly saline, sodic loam about 22 inches thick. The substratum to a depth of 60 inches or more is very pale brown loam.

Included in this unit are small areas of Osborn silty clay loam, Poe loamy fine sand, and Zuman loamy fine sand. Included areas make up about 10 percent of the total acreage.

Permeability is moderate in the Laki soil. Available water capacity is very high. The effective rooting depth is 60 inches or more, but it is affected by the seasonal high water table, which is maintained at a depth of 3 to 5 feet from March through September. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is subject to rare flooding unless it is protected by dikes and levees.

This unit is used for cultivated crops and for hay and pasture.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the hazard of soil blowing, the seasonal high water table, the sodicity, the content of salts, and the likelihood that frost will occur during any month of the growing season. When the wind velocity is high in spring, soil blowing can be controlled by returning all crop residue to the soil and minimizing tillage. Floodwater and the seasonal high water table can damage crops by submerging them. Deep drains are needed to lower the water table below the root zone of the crops. Because drainage outlets are not available, pumps are needed. The sodicity can limit the growth of crops. The content of toxic salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil.

Sprinkler irrigation systems are suitable on this unit. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. Many areas are subirrigated by the water table, but this method of irrigation can increase the amount of sodium and salts in the soil. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil.

If this unit is used for hay and pasture, the main management concern is the seasonal high water table. If the high water table persists in spring, it could have a detrimental effect on deep-rooted crops. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Irrigation water can be applied by the border and sprinkler methods. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the plants but also to the available water capacity and rate of water intake in the soil.

If this unit is used for windbreaks and environmental plantings, the main management concerns are the concentration of toxic salts and the seasonal high water table. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. The trees and shrubs selected for planting should be those that can withstand toxicity. Examples are Scotch pine, Siberian elm, Russian-olive, and multiflora rose.

This unit is in capability unit IIIw-1, irrigated, and capability subclass VIe, nonirrigated. It is in MLRA 21.

137—Laki-Henley complex, 0 to 2 percent slopes. This map unit is on low terraces. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,080 to 4,100 feet. The average annual precipitation is about 11 inches, the average annual air

temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

This unit is about 50 percent Laki fine sandy loam and 40 percent Henley sandy loam. The Laki soil is on mounds, and the Henley soil is in areas between the mounds.

Included in this unit are small areas of Lamath silt loam and soils that are similar to the Henley soil but are clayey throughout or are less than 20 inches deep over a duripan. Also included are small areas of soils that are similar to the Laki soil but have slopes of more than 2 percent. Included areas make up about 10 percent of the total acreage.

The Laki soil is very deep and artificially drained. The water table is controlled by pumping from deep lateral drains. The soil formed in moderately well drained alluvium and lacustrine sediment derived from basalt, tuff, diatomite, and volcanic ash. Typically, the surface layer is grayish brown fine sandy loam about 12 inches thick. The subsoil is light brownish gray loam about 22 inches thick. The substratum to a depth of 60 inches or more is very pale brown loam. The soil is slightly saline or moderately saline and sodic throughout.

Permeability is moderate in the Laki soil. Available water capacity is very high because of the influence of diatomite and volcanic ash. The effective rooting depth is 60 inches or more, but it is affected by the water table, which is maintained at a depth of 3 to 5 feet from March through September. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is subject to rare flooding unless it is protected by dikes and levees.

The Henley soil is moderately deep and artificially drained. The water table is controlled by pumping from deep lateral drains. The soil formed in somewhat poorly drained, mixed alluvium and lacustrine sediment derived from volcanic ash, diatomite, and extrusive igneous rock. Typically, the surface layer is light brownish gray, slightly saline, sodic sandy loam about 11 inches thick. The subsoil is light gray, slightly saline, sodic fine sandy loam about 14 inches thick. The next layer is a light gray hardpan about 6 inches thick. The underlying material to a depth of 60 inches or more is light gray, stratified silt loam.

Permeability is moderate in the Henley soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches in areas where the soil is artificially drained. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. Where the soil is not drained, the seasonal high water table is between depths of 1.0 foot and 3.5 feet from March through September. This soil is subject to rare flooding unless it is protected by dikes and levees.

This unit is used mainly for wildlife habitat. It also is used as rangeland.

This unit provides habitat for such wildlife species as ring-necked pheasants, ducks, geese, coyotes, jackrabbits, mule deer, and birds of prey. The plants that can withstand toxicity should be selected for seeding if the wildlife habitat is to be improved by reseeding.

The main concerns affecting range management are the hazard of soil blowing, salinity, and sodicity in areas of the Laki soil and the salinity and sodicity in areas of the Henley soil. The production of forage is limited by the salinity and sodicity. Management practices that overcome these limitations generally are not feasible. Seeding generally is not feasible. The potential plant community is mainly basin wildrye, inland saltgrass, and black greasewood.

If the Laki soil is used for windbreaks and environmental plantings, the main management concern is the concentration of toxic salts. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. The trees and shrubs selected for planting should be those that can withstand toxicity. Examples are Scotch pine, Siberian elm, Russian-olive, and multiflora rose.

The unit is in capability subclass VIe, nonirrigated, and in MLRA 21.

138—Lalos very fine sandy loam, 2 to 15 percent slopes. This very deep, well drained soil is in areas of dunes on lakeshores. It formed in eolian material derived from lacustrine sediment. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,080 to 4,200 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

Typically, the surface layer is pale brown and light brownish gray, very slightly saline very fine sandy loam about 13 inches thick. The subsoil is pinkish gray, slightly saline, sodic clay loam about 17 inches thick. The substratum to a depth of about 65 inches is moderately saline and sodic. It is very pale brown loam and pale brown very fine sandy loam.

Included in this unit are small areas of soils that are similar to the Lalos soil but have an underlying layer of loamy sand. Also included are small areas of Zuman silt loam and Lamath silt loam. Included areas make up about 15 percent of the total acreage.

Permeability is moderately slow in the Lalos soil.

Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow or medium, and the hazard of water erosion is slight or moderate. The hazard of soil blowing is moderate.

This unit is used mainly for wildlife habitat. It also is used as rangeland.

This unit provides habitat for such wildlife species as ring-necked pheasants, coyotes, jackrabbits, mule deer, and birds of prey. The plants that can withstand sodicity should be selected for seeding if the wildlife habitat is to be improved by reseeding.

The main concerns affecting range management on the Lalos soil are the hazard of soil blowing, the salinity, and the sodicity. The production of forage is limited by the salinity and sodicity. Management practices that overcome these limitations generally are not feasible. Seeding disturbed areas to native or tame pasture plants helps to control soil blowing. The species that can withstand sodicity should be selected for seeding.

Black greasewood readily invades areas of the Lalos soil. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where black greasewood has increased in abundance, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly basin wildrye, inland saltgrass, spiny hopsage, and black greasewood.

If this unit is used for windbreaks and environmental plantings, the main management concern is the concentration of toxic salts. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. The trees and shrubs selected for planting should be those that can withstand toxicity. Examples are Scotch pine, Siberian elm, Russian-olive, and multiflora rose.

This unit is in capability subclass VIe, nonirrigated, and in MLRA 21.

139—Lalos-Blownout land complex, 0 to 9 percent slopes. This map unit is in areas of eolian dunes on lakeshores. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,080 to 4,100 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 70 days. Frost can occur during any month of the year.

This unit is about 50 percent Lalos very fine sandy loam and 40 percent Blownout land. The Lalos soil is on the dunes, and the Blownout land is in the areas between the dunes.

Included in this unit are small areas of Lamath silt loam, Capjac silt loam, and Forbar fine sand. Also included are small areas of soils that are similar to the Lalos soil but have a dark surface layer. Included areas make up about 10 percent of the total acreage.

The Lalos soil is very deep and well drained. It formed in eolian material derived from lacustrine sediment. Slope is 2 to 9 percent. Typically, the surface layer is pale brown and light brownish gray very fine sandy loam about 13 inches thick. The subsoil is about 17 inches thick. It is slightly saline and sodic. It is light gray loam and pinkish gray clay loam. The substratum to a depth of 65 inches is moderately saline and sodic. It is very pale brown loam and pale brown very fine sandy loam.

Permeability is moderately slow in the Lalos soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow or medium, and the hazard of water erosion is slight or moderate. The hazard of soil blowing is moderate.

Blownout land consists of areas from which all or most of the soil material has been removed by the wind. Tuff was left after the soil material was removed. Slope is 0 to 2 percent.

This unit is used mainly for wildlife habitat. It also is used as rangeland.

This unit provides habitat for such wildlife species as ring-necked pheasants, ducks, geese, coyotes, jackrabbits, mule deer, and birds of prey. The plants that can withstand toxicity should be selected for seeding if the wildlife habitat is to be improved by reseeding.

The main concerns affecting range management on the Lalos soil are the hazard of soil blowing, the salinity, and the sodicity. The production of forage is limited by the salinity and sodicity. Management practices that overcome these limitations generally are not feasible. Seeding disturbed areas to native or tame pasture plants helps to control soil blowing. The species that can withstand sodicity should be selected for seeding.

Black greasewood readily invades areas of the Lalos soil. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where black greasewood has increased in abundance, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community on the Lalos soil is mainly basin wildrye, inland saltgrass, spiny hopsage, and black greasewood.

If the Lalos soil is used for windbreaks and environmental plantings, the main management concern is the concentration of toxic salts. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. The trees and shrubs selected for planting should be those that can withstand toxicity. Examples are Scotch pine, Siberian elm, Russian-olive, and multifora rose.

The Lalos soil is in capability subclass VIe, nonirrigated, and the Blownout land is in capability class VIII. Both are in MLRA 21.

140—Lamath silt loam, 0 to 1 percent slopes. This very deep, artificially drained soil is in lake basins. It is protected from flooding by dikes and levees. The water table is controlled by pumping from deep lateral drains. The soil formed in poorly drained, stratified lacustrine sediment derived from diatomite, volcanic ash, and extrusive igneous rock. The native vegetation is mainly salt-tolerant perennial grasses, forbs, and shrubs. Elevation is 4,030 to 4,100 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 70 days. Frost can occur during any month of the year.

Typically, the surface layer and subsoil are gray and light gray, very slightly saline silt loam about 21 inches thick. The upper 16 inches of the substratum is light brownish gray, very slightly saline sand, the next 16 inches is grayish brown and light gray, very slightly saline loamy sand, and the lower part to a depth of 60 inches or more is stratified, light gray, slightly saline sand and loam.

Included in this unit are small areas of Capjac silt loam and Tulana silt loam. Also included are small areas of soils that are similar to the Lamath soil but have a thicker surface layer. Included areas make up about 10 percent of the total acreage.

Permeability is moderate to a depth of 21 inches in the Lamath soil and moderately rapid below that depth. Available water capacity is very high because of the influence of diatomite and volcanic ash. The effective rooting depth is 60 inches or more, but it is affected by the water table, which is maintained at a depth of 1.5 to 3.0 feet throughout the year. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate when the surface layer dries and the wind velocity is high. This soil is subject to rare flooding from March through May unless it is protected by dikes and levees.

This unit is used mainly for wildlife habitat. It also is used for cultivated crops, hay and pasture, and rangeland.

This unit is frequented by migratory waterfowl. It provides food and cover for such wildlife species as ducks, geese, ring-necked pheasants, and birds of prey. Developing shallow water areas can improve the habitat for waterfowl.

If this unit is used for irrigated wheat, barley, and oats, the main management concerns are the hazard of soil blowing, the hazard of flooding, and the seasonal high water table. Soil blowing can be controlled by returning crop residue to the soil and applying a system of conservation tillage. Floodwater and the seasonal high water table can damage crops by submerging them. The unusually high available water capacity of the soil can delay or inhibit farming in spring. Although all areas are protected from flooding by dikes, the dikes can fail because they are constructed with material having low strength. Deep drains are needed to lower the water table below the root zone of the crops. Because drainage outlets are not available, pumps are needed.

Border and sprinkler irrigation systems are suitable on this unit. Many areas are subirrigated by the water table, but this method of irrigation can increase the amount of sodium and salts in the soil. The layers of contrasting textures in the upper part of the subsoil can affect the infiltration of irrigation water into the soil. To avoid overirrigation, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Because of the very high available water capacity, the frequency of irrigation can be reduced. The accumulation of water at the end of borders can be minimized by proper irrigation management.

Few limitations affect the production of irrigated hay and pasture. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Irrigation water can be applied by the border and sprinkler methods. The layers of contrasting textures in the upper part of the subsoil can affect the infiltration of irrigation water into the soil. To avoid overirrigation, applications of water should be adjusted not only to the needs of the plants but also to the available water capacity and rate of water intake in the soil. Because of the very high available water capacity, the frequency of irrigation can be reduced.

The main concerns affecting range management are the seasonal high water table and the salinity. The species that can withstand a high water table and salinity should be selected for seeding. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. The

water table provides extra moisture for high forage production. The soil can provide green feed throughout the growing season. The potential plant community is mainly inland saltgrass, foxtail barley, and black greasewood.

If this unit is used for windbreaks and environmental plantings, the main management concerns are the concentration of toxic salts and the seasonal water table. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. The trees and shrubs selected for planting should be those that can withstand toxicity. Examples are Scotch pine, Siberian elm, Russian-olive, and multiflora rose.

This unit is in capability unit IIIw-2, irrigated, and capability subclass VIw, nonirrigated. It is in MLRA 21.

141—Leavers sandy loam, 0 to 2 percent slopes. This very deep, moderately well drained soil is on alluvial plains. It formed in alluvium derived from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,300 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 40 days. Frost can occur during any month of the year.

Typically, the surface layer is gray and grayish brown sandy loam about 15 inches thick. The subsoil is light brownish gray sandy loam about 10 inches thick. The upper 8 inches of the substratum is light gray very gravelly loamy sand, and the lower part to a depth of 60 inches or more is light brownish gray and light gray very gravelly sand that has many medium, prominent, strong brown mottles.

Included in this unit are small areas of Poman loamy sand, Munnell gravelly sandy loam, and Fordney loamy fine sand. Also included are small areas of Truax fine sandy loam. Included areas make up about 10 percent of the total acreage.

Permeability is moderately rapid in the Leavers soil. Available water capacity is low. The effective rooting depth is 60 inches or more. The seasonal high water table is at a depth of 3.5 to 6.0 feet from December through March. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for cultivated crops, hay and pasture, and homesite development.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the hazard of soil blowing, a rapid rate of water intake, the low available water capacity, the seasonal high water table, and the likelihood that frost will occur during any month of the growing season. Soil blowing can be controlled by applying a system of conservation tillage and keeping the soil rough and cloddy when it is not protected by vegetation. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. The high content of gravel in the soil reduces the amount of moisture available for plant growth. Because the soil is droughty, applications of water should be light and frequent. A high water table that persists in spring could have a detrimental effect on deep-rooted crops. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage.

If this unit is used for irrigated hay and pasture, the main management concern is the seasonal high water table. The water that builds up during the rainy period in spring may limit the suitability of this soil for deep-rooted crops. Sprinkler irrigation is the best method of applying water. Because the soil is droughty, applications of water should be light and frequent.

If this unit is used for windbreaks and environmental plantings, the main management concern is droughtiness. The droughtiness of the surface layer increases the seedling mortality rate. Irrigation is needed when seedlings are planted. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are Scotch pine, Siberian elm, multiflora rose, and Russian-olive.

If this unit is used for homesite development, the main management concerns are the hazard of ground-water contamination, the hazard of soil blowing, and low fertility. If the density of housing is moderate or high, community sewage disposal systems are needed to prevent the contamination of water supplies caused by seepage from onsite sewage disposal systems. Revegetating as soon as possible in disturbed areas around construction sites helps to control soil blowing. Mulch, applications of fertilizer, and irrigation are needed where lawn grasses and other small-seeded plants are becoming established.

This unit is in capability unit IIIe-1, irrigated, and capability subclass VIe, nonirrigated. It is in MLRA 21.

142—Leavers sandy loam, drained, 0 to 5 percent slopes. This very deep, moderately well drained soil is on alluvial plains. It formed in alluvium derived from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,300 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about

40 days. Frost can occur during any month of the year.

Typically, the surface layer is gray and grayish brown sandy loam about 15 inches thick. The subsoil is light brownish gray sandy loam about 10 inches thick. The upper 8 inches of the substratum is light gray very gravelly loamy sand, and the lower part to a depth of 60 inches or more is light brownish gray and light gray very gravelly sand.

Included in this unit are small areas of Poman loamy sand, Munnell gravelly sandy loam, and Fordney loamy fine sand. Also included are small areas of Truax fine sandy loam. Included areas make up about 10 percent of the total acreage.

Permeability is moderately rapid in the Leavers soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for cultivated crops, hay and pasture, and homesite development.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the hazard of soil blowing, a rapid rate of water intake, the low available water capacity, and the likelihood that frost will occur during any month of the growing season. Soil blowing can be controlled by applying a system of conservation tillage and keeping the soil rough and cloddy when it is not protected by vegetation. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. The high content of gravel in the soil reduces the amount of moisture available for plant growth. Because the soil is droughty, applications of water should be light and frequent. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage.

If this unit is used for irrigated hay and pasture, the main management concern is droughtiness. Because the soil is droughty, applications of water should be light and frequent. Sprinkler irrigation is the best method of applying water.

If this unit is used for windbreaks and environmental plantings, the main management concern is droughtiness. The droughtiness of the surface layer increases the seedling mortality rate. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are Norway spruce, hybrid popular, Russian-olive, and lilac.

If this unit is used for homesite development, the main management concerns are the hazard of soil blowing, the hazard of ground-water contamination, and low fertility. If the density of housing is moderate or high, community sewage systems are needed to prevent the contamination of water supplies caused by seepage from onsite sewage disposal systems. Revegetating as soon as possible in disturbed areas around construction sites helps to control soil blowing. Mulch, applications of fertilizer, and irrigation are needed where lawn grasses and other small-seeded plants are becoming established.

This unit is in capability unit IIIe-1, irrigated, and capability subclass VIe, nonirrigated. It is in MLRA 21.

143—Lequieu very stony loam, 0 to 2 percent slopes. This very shallow, well drained soil is on plateaus. It formed in material weathered from basalt. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 4,800 feet. The average annual precipitation is 12 inches, the average annual air temperature is 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, about 50 percent of the surface is covered with stones and cobbles. The surface layer is pale brown very stony loam about 3 inches thick. The substratum is pale brown very cobbly loam about 5 inches thick. Hard bedrock is at a depth of about 8 inches.

Included in this unit are small areas of Capona cobbly loam and Stukel sandy loam. Included areas make up about 15 percent of the total acreage.

Permeability is moderate in the Lequieu soil. Available water capacity is very low. The effective rooting depth is 6 to 10 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as rangeland. The main concerns affecting range management are the restricted depth to bedrock and the stones on and below the surface. The production of forage is limited by the shallow rooting depth and the high content of gravel, stones, and cobbles in the soil, both of which reduce the amount of moisture available for plant growth. Building fences is difficult on this very shallow soil. As a result, special design is needed. The stones on the surface limit access by most equipment. Seeding generally is not feasible. The potential plant community is mainly bluebunch wheatgrass, Idaho fescue, and low sagebrush.

This unit is in capability subclass VIIs, nonirrigated, and in MLRA 21.

144—Lequieu-Adieux complex, 0 to 5 percent slopes. This map unit is on plateaus. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 4,800 feet. The average

annual precipitation is about 14 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

This unit is about 50 percent Lequieu very stony loam and 40 percent Adieux sandy loam. The Lequieu soil is in areas between mounds, and the Adieux soil is on the mounds.

Included in this unit are small areas of Lorella very stony loam and soils that are similar to the Lequieu soil but have bedrock at a depth of 10 to 20 inches or less than 6 inches. Included areas make up about 10 percent of the total acreage.

The Lequieu soil is very shallow and well drained. It formed in material weathered from basalt. Typically, about 40 percent of the surface is covered with stones and cobbles. The surface layer is pale brown very stony loam about 3 inches thick. The substratum is pale brown very cobbly loam about 5 inches thick. Hard bedrock is at a depth of about 8 inches.

Permeability is moderate in the Lequieu soil. Available water capacity is very low. The effective rooting depth is 6 to 10 inches. Runoff is slow, and the hazard of water erosion is slight.

The Adieux soil is moderately deep and well drained. It formed in material weathered from basalt. Typically, about 2 percent of the surface is covered with stones and cobbles. The surface layer is brown sandy loam about 4 inches thick. The subsoil is brown and yellowish brown loam about 28 inches thick. Hard bedrock is at a depth of about 32 inches.

Permeability is moderate in the Adieux soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as rangeland. The main concerns affecting range management on the Lequieu soil are the restricted depth to bedrock and the stones on and below the surface. Soil properties seldom limit range management on the Adieux soil. The production of forage on the Lequieu soil is limited by the shallow rooting depth and the stoniness. The high percentage of gravel, stones, and cobbles in this soil reduces the amount of moisture available for plant growth. Building fences is difficult on this shallow soil. As a result, special design is needed. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods.

Western juniper readily invades areas of the Adieux soil. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where western juniper has increased in abundance, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly bluebunch wheatgrass, Idaho fescue, and low sagebrush on the Lequieu soil and bluebunch wheatgrass, Idaho fescue, Thurber needlegrass, and mountain big sagebrush on the Adieux soil.

Where the Adieux soil has been invaded by western juniper, the mean site index is 23, on the basis of a 50-year site index. The soil can produce 348 cubic feet of wood per acre in a stand of trees that average 30 square feet in the basal area and 13.8 inches in diameter at breast height. The stoniness on the adjacent soils limits the accessibility for woodcutting and for other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

The Lequieu soil is in capability subclass VIIe, nonirrigated, and the Adieux soil is in capability unit IVe-1, nonirrigated. Both soils are in MLRA 21.

145—Lorella-Fiddler complex, 5 to 30 percent slopes. This map unit is on hills. The native vegetation is mainly perennial grasses, forbs, shrubs, and western juniper. Elevation is 4,200 to 4,800 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days.

This unit is about 45 percent Lorella very stony loam and 40 percent Fiddler very stony loam.

Included in this unit are small areas of Dunnlake very stony loam, Bucklake loam, Lequieu very stony loam, and Adieux sandy loam. Also included are small areas of Rock outcrop. Included areas make up about 15 percent of the total acreage.

The Lorella soil is shallow and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 40 percent of the surface is covered with stones and cobbles. The surface layer is brown and dark grayish brown very stony loam about 8 inches thick. The upper 3 inches of the subsoil is dark grayish brown very cobbly clay loam. The lower 5 inches is dark brown very cobbly clay. Hard bedrock is at a depth of about 16 inches. In some areas the surface layer is stony loam.

Permeability is slow in the Lorella soil. Available water capacity is very low. The effective rooting depth is 12 to 20 inches. Runoff is medium or rapid, and the hazard of water erosion is moderate or severe.

The Fiddler soil is moderately deep and well drained. It formed in material weathered from extrusive igneous

rock. Typically, about 30 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown very stony loam about 8 inches thick. The upper 13 inches of the subsoil is brown very stony clay loam and very stony clay. The lower 5 inches is strong brown very stony clay loam. Hard bedrock is at a depth of about 26 inches. Stones and cobbles cover 20 to 30 percent of the surface.

Permeability is slow in the Fiddler soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is medium or rapid, and the hazard of water erosion is moderate or severe.

This unit is used for production of western juniper and for livestock grazing.

Where this unit is used for western juniper, the site index is 24 on the Lorella soil and 27 on the Fiddler soil, on the basis of a 50-year site index. The Lorella soil can produce 885 cubic feet of wood per acre in a stand of trees that average 70 square feet in the basal area and 11.1 inches in diameter at breast height. The Fiddler soil can produce 548 cubic feet of wood per acre in a stand of trees that average 47 square feet in the basal area and 11.9 inches in diameter at breast height. The stoniness and the slope limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

Where the density of the woodland canopy is less than 40 percent, the soils produce a limited grazeable understory. Properly managing livestock grazing helps to control erosion. The characteristic understory plant community is mainly Idaho fescue, cheatgrass, big sagebrush, and Nevada bluegrass on the Lorella soil and big sagebrush, bluebunch wheatgrass, and Nevada bluegrass on the Fiddler soil.

The Lorella soil is in capability subclass VIIe, nonirrigated, and the Fiddler soil is in capability subclass VIe, nonirrigated. Both soils are in MLRA 21.

146—Madeline-Capona complex, 2 to 15 percent slopes. This map unit is on pediments and mountain side slopes. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,400 to 5,000 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 65 days.

This unit is about 70 percent Madeline soil and 20 percent Capona soil.

Included in this unit are small areas of Orhood very cobbly loam and Lequieu very stony loam. Included areas make up about 10 percent of the total acreage.

The Madeline soil is shallow and well drained. It formed in material weathered from tuff and basalt. Typically, about 35 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown very cobbly loam about 6 inches thick. The upper 7 inches of the subsoil is brown cobbly clay. The lower 3 inches is brown gravelly clay. Hard bedrock is at a depth of about 16 inches.

Permeability is slow in the Madeline soil. Available water capacity is very low or low. The effective rooting depth is 12 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Capona soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 20 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown and brown cobbly loam about 10 inches thick. The subsoil is brown cobbly loam about 24 inches thick. Hard bedrock is at a depth of about 34 inches.

Permeability is moderate in the Capona soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

This unit is used as rangeland. The main concerns affecting range management are the surface stoniness of both soils and the restricted depth to bedrock in the Madeline soil. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage on the Madeline soil is limited by the shallow rooting depth. Building fences is difficult on this shallow soil. As a result, special design is needed.

Western juniper readily invades areas of this unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly Idaho fescue, bluebunch wheatgrass, and low sagebrush on the Madeline soil and Idaho fescue, bluebunch wheatgrass, Thurber needlegrass, and mountain big sagebrush on the Capona soil.

Where this unit has been invaded by western juniper, the site index is 21 on the Madeline soil and 26 on the Capona soil, on the basis of a 50-year site index. The Madeline soil can produce 671 cubic feet of wood per

acre in a stand of trees that average 58 square feet in the basal area and 13.2 inches in diameter at breast height. The Capona soil can produce 632 cubic feet of wood per acre in a stand of trees that average 50 square feet in the basal area and 15.7 inches in diameter at breast height. The stoniness limits the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

The Madeline soil is in capability subclass VIIs, nonirrigated, and the Capona soil is in capability subclass VIe, nonirrigated. Both soils are in MLRA 21.

147—Mahogan-Fredonyer complex, 5 to 30 percent slopes. This map unit is on mountains. The native vegetation is mainly perennial grass, forbs, and shrubs. Elevation is 5,200 to 6,000 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 60 days. Frost can occur during any month of the year.

This unit is 55 percent Mahogan loam and 40 percent Fredonyer very stony loam.

Included in this unit are small areas of Pinehurst loam and soils that are similar to the Mahogan soil but more than 40 inches deep over bedrock. Also included are small areas of soils that are similar to the Fredonyer soil but have less than 35 percent rock fragments. Included areas make up about 5 percent of the total acreage.

The Mahogan soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, the surface layer is grayish brown loam about 13 inches thick. The upper 13 inches of the subsoil is brown gravelly loam. The lower 12 inches is brown gravelly sandy clay loam. Hard bedrock is at a depth of about 38 inches.

Permeability is moderate in the Mahogan soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium or rapid, and the hazard of water erosion is moderate or severe.

The Fredonyer soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 40 percent of the surface is covered with stones and cobbles. The surface layer is dark grayish brown very stony loam about 10 inches thick. The subsoil is grayish brown very cobbly loam about 15 inches thick. Hard bedrock is at a depth of about 25 inches.

Permeability is moderate in the Fredonyer soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is medium or rapid, and the hazard of water erosion is moderate or severe.

This unit is used as rangeland. Soil properties seldom limit range management on the Mahogan soil. The main concern affecting range management on the Fredonyer soil is the stones on and below the surface. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods.

Western juniper readily invades areas of the Fredonyer soil. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly mountain big sagebrush, Idaho fescue, and bluebunch wheatgrass on the Mahogan soil and Idaho fescue, mountain big sagebrush, bluebunch wheatgrass, and curlleaf mountainmahogany on the Fredonyer soil.

Where the Fredonyer soil has been invaded by western juniper, the mean site index is 21, on the basis of a 50-year site index. The soil can produce 690 cubic feet of wood per acre in a stand of trees that average 63 square feet in the basal area and 12.9 inches in diameter at breast height. The slope and the stoniness limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

The Mahogan soil is in capability unit IVe-1, nonirrigated, and the Fredonyer soil is in capability subclass VIs, nonirrigated. Both soils are in MLRA 21.

148—Medford silty clay loam, 0 to 2 percent slopes. This very deep, moderately well drained soil is on terraces. It formed in alluvium derived from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,300 to 4,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown silty clay loam about 6 inches thick. The upper 4 inches of the subsoil is grayish brown silty clay loam. The lower 26 inches is grayish brown and brown silty clay. The

substratum to a depth of 62 inches is pale brown, stratified sandy clay loam.

Included in this unit are small areas of Modoc loam, Pit silty clay, and Teeters silt loam. Included areas make up about 10 percent of the total acreage.

Permeability is moderately slow in the Medford soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops and for hay and pasture.

Few limitations affect the use of this unit for irrigated and nonirrigated wheat or for irrigated barley. Furrow, border, and sprinkler irrigation systems are suitable on this unit. If sprinkler irrigation is used, applying the water at a slow rate over a long period minimizes runoff and helps to ensure that the root zone is properly wetted. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

Few limitations affect the use of this unit for irrigated hay and pasture. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

The unit is in capability units IIIc-1, irrigated, and IVc-1, nonirrigated. It is in MLRA 21.

149—Modoc loam, 0 to 2 percent slopes. This moderately deep, well drained soil is on lake terraces. It formed in lacustrine sediment and alluvium derived from basalt, andesite, diatomite, and pyroclastic rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown loam about 12 inches thick. The upper 9 inches of the subsoil is light brownish gray loam. The lower 13 inches is pale brown sandy clay loam. The next layer is a light gray hardpan about 21 inches thick. The substratum to a depth of 60 inches or more is light gray, stratified sandy loam.

Included in this unit are small areas of Mudco gravelly sandy loam, Truax fine sandy loam, and Rojo sandy loam. Also included are small areas of Fordney loamy fine sand. Included areas make up about 10 percent of the total acreage.

Permeability is moderately slow in the Modoc soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, and rangeland.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the restricted depth to a hardpan and the likelihood that frost will occur during any month of the growing season. Ripping and shattering the hardpan can increase the effective rooting depth and improve the internal drainage. Ripping may not be feasible in some areas because of the thickness of the hardpan.

Furrow, border, corrugation, and sprinkler irrigation systems are suitable on this unit. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. Good irrigation management helps to prevent the development of a temporary water table above the hardpan. Applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil.

If this unit is used for irrigated hay and pasture, the main management concern is the restricted depth to a hardpan. The cemented pan reduces the yield of deep-rooted plants. Ripping may not be feasible in some areas because of the thickness of the hardpan. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Irrigation water can be applied by the sprinkler and border methods.

Few limitations affect range management. This unit responds well to range seeding and to proper grazing use. The potential plant community is mainly basin wildrye and basin big sagebrush.

If this unit is used for windbreaks and environmental plantings, the main management concern is the restricted depth to a hardpan. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are ponderosa pine, black locust, American plum, and Tatarian honeysuckle.

This unit is in capability unit IIIs-8, irrigated, and capability subclass VIs, nonirrigated. It is in MLRA 21.

150—Modoc loam, bedrock substratum, 2 to 5 percent slopes. This moderately deep, well drained soil is on lake terraces. It formed in lacustrine sediment and alluvium derived from basalt, andesite, and pyroclastic rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 4,800 feet. The average annual precipitation is about 12 inches, the

average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown loam about 8 inches thick. The upper 5 inches of the subsoil is grayish brown clay loam. The lower 12 inches is brown clay loam. The next layer is a pink hardpan about 23 inches thick. Hard bedrock is at a depth of about 48 inches.

Included in this unit are small areas of Modoc loam, Truax fine sandy loam, and Rojo sandy loam. Also included are small areas of Fordney loamy fine sand. Included areas make up about 10 percent of the total acreage.

Permeability is moderately slow in the Modoc soil. Available water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, and rangeland.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the restricted depth to a hardpan and the likelihood that frost will occur during any month of the growing season. Ripping of the hardpan is not feasible because of the restricted depth to bedrock. Sprinkler irrigation systems are suitable on this unit. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil.

If this unit is used for irrigated hay and pasture, the main management concern is the restricted depth to a hardpan. The cemented pan reduces the yield of deep-rooted plants. Because of the underlying bedrock, ripping the hardpan is not feasible. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Irrigation water can be applied by sprinkler systems.

Few limitations affect range management. This unit responds well to range seeding and to proper grazing use. The potential plant community is mainly bluebunch wheatgrass, basin big sagebrush, and Idaho fescue.

If this unit is used for windbreaks and environmental plantings, the main management concern is the restricted depth to a hardpan. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are ponderosa pine, black locust, American plum, and Tatarian honeysuckle.

This unit is in capability unit IIIe-8, irrigated, and capability subclass VIe, nonirrigated. It is in MLRA 21.

151—Mojo-Pinehurst complex, 5 to 15 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers, perennial grasses, forbs, and shrubs. Elevation is 4,400 to 6,000 feet. The average annual precipitation is about 25 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

This unit is about 45 percent Mojo stony loam and 40 percent Pinehurst stony sandy loam.

Included in this unit are small areas of Snell very stony loam, Sheld stony sandy loam, and Orset sandy loam. Included areas make up about 15 percent of the total acreage.

The Mojo soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, bark, grass blades, and other organic debris about 2 inches thick. Also, about 10 percent of the surface is covered with stones and cobbles. The surface layer is brown stony loam about 9 inches thick. The upper 18 inches of the subsoil is brown and light brown clay loam. The lower 9 inches is reddish yellow very gravelly clay loam. Hard bedrock is at a depth of about 36 inches.

Permeability is moderately slow in the Mojo soil. Available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Pinehurst soil is deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. Also, about 10 percent of the surface is covered with stones and cobbles. The surface layer is brown stony sandy loam about 15 inches thick. The upper 14 inches of the subsoil is brown gravelly loam. The lower 26 inches is light brown gravelly loam and very stony loam. Soft bedrock is at a depth of about 55 inches.

Permeability is moderate in the Pinehurst soil. Available water capacity also is moderate. The effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is slight.

This unit is used for woodland and livestock grazing.

Ponderosa pine, Douglas-fir, incense cedar, and

white fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for ponderosa pine is 60 on the Mojo soil and 75 on the Pinehurst soil. The potential annual production of ponderosa pine on the Mojo soil is about 15 cubic feet, or 78 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees. The potential annual production of ponderosa pine on the Pinehurst soil is about 29 cubic feet, or 151 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees.

Plant competition is the main concern affecting timber production. Proper site preparation controls initial plant competition, and spraying, cutting, or girdling controls the subsequent growth of competing plants. Unless the site is adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Examples of suitable trees are ponderosa pine, Douglas-fir, and white fir.

Where this unit is used for livestock grazing, the forest canopy is less than 40 percent. The characteristic understory plant community is mainly curlleaf mountainmahogany, squawcarpet, bottlebrush squirreltail, and Nevada bluegrass on the Mojo soil and manzanita, squawcarpet, bottlebrush squirreltail, and Idaho fescue on the Pinehurst soil.

This unit is in capability unit IVe-7, nonirrigated, and in MLRA 22.

152—Mojo-Pinehurst complex, 15 to 30 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers, perennial grasses, forbs, and shrubs. Elevation is 4,400 to 6,000 feet. The average annual precipitation is about 25 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

This unit is about 50 percent Mojo soil and 40 percent Pinehurst soil.

Included in this unit are small areas of Snell very stony loam, Sheld stony sandy loam, and Orset sandy loam. Included areas make up about 10 percent of the total acreage.

The Mojo soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, bark, grass blades, and other organic debris about 2 inches thick. Also, about 10 percent of the surface is covered with stones and cobbles. The surface layer is brown stony loam about 9 inches thick. The upper 18 inches of the subsoil is brown and light brown clay loam. The lower 9 inches is reddish yellow very gravelly clay loam. Hard bedrock is at a depth of about 36 inches.

Permeability is moderately slow in the Mojo soil. Available water capacity is moderate. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Pinehurst soil is deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. Also, about 10 percent of the surface is covered with stones and cobbles. The surface layer is brown stony sandy loam about 15 inches thick. The upper 14 inches of the subsoil is brown gravelly loam. The lower 26 inches is light brown gravelly loam and very stony loam. Soft bedrock is at a depth of about 55 inches.

Permeability is moderately slow in the Pinehurst soil. Available water capacity also is moderate. The effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used for woodland and livestock grazing.

Ponderosa pine, Douglas-fir, incense cedar, and white fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for ponderosa pine is 60 on the Mojo soil and 73 on the Pinehurst soil. The potential annual production of ponderosa pine on the Mojo soil is about 15 cubic feet, or 78 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees. The potential annual production of ponderosa pine on the Pinehurst soil is about 29 cubic feet, or 151 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees.

The main concern affecting timber production and harvesting is plant competition. Proper site preparation controls initial plant competition, and spraying, cutting, or girdling controls the subsequent growth of competing plants. Unless the site is adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Examples of suitable trees are ponderosa pine, Douglas-fir, and white fir.

Where this unit is used for livestock grazing, the forest canopy is less than 40 percent. The characteristic understory plant community is mainly curlleaf mountainmahogany, squawcarpet, bottlebrush squirreltail, and Idaho fescue on the Pinehurst soil.

This unit is in capability unit IVe-7, nonirrigated, and in MLRA 22.

153—Mudco gravelly sandy loam, 2 to 5 percent slopes. This shallow, well drained soil is on terraces. It formed in alluvium derived from tuff and basalt. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,300 to 4,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown gravelly sandy loam about 7 inches thick. The upper 3 inches of the subsoil is brown sandy loam. The lower 7 inches is brown gravelly sandy clay loam. Below this to a depth of 60 inches or more is a pink hardpan.

Included in this unit are small areas of Modoc loam and Rojo sandy loam. Also included are small areas of Fordney loamy fine sand. Included areas make up about 15 percent of the total acreage.

Permeability is moderately slow in the Mudco soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops. If the unit is used for irrigated wheat, barley, or oats, the main management concerns are the very low available water capacity and the restricted depth to a hardpan. Management practices that overcome these limitations generally are not feasible. Sprinkler irrigation systems are suitable on this unit. Applying the water slowly minimizes runoff.

This unit is in capability subclass VIe, irrigated and nonirrigated, and in MLRA 21.

154—Munnell gravelly loam, 0 to 5 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 4,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is brown gravelly loam about 5 inches thick. The subsoil is brown, reddish gray, and reddish brown gravelly loam about 27 inches thick. The substratum to a depth of 60 inches or more is reddish brown very gravelly sand.

Included in this unit are small areas of Modoc loam, Rojo sandy loam, and Truax fine sandy loam. Also included are small areas of soils that are similar to the Munnell soil but are more than 40 inches deep to very gravelly sand. Included areas make up about 10 percent of the total acreage.

Permeability is moderate in the Munnell soil. Available water capacity is low or moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay, pasture, and rangeland.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concern is the likelihood that frost will occur during any month of the growing season. Sprinkler irrigation is the best method of applying water. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage.

Few limitations affect the use of this unit for irrigated hay and pasture. Grasses and legumes grow well if an adequate amount of fertilizer is applied. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Irrigation water can be applied by the sprinkler method.

Few limitations affect range management. This unit responds well to range seeding and to proper grazing use. The potential plant community is mainly bluebunch wheatgrass, Thurber needlegrass, mountain big sagebrush, and Idaho fescue.

Few limitations affect the use of this unit for windbreaks and environmental plantings. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are Norway spruce, hybrid poplar, Russian-olive, and lilac.

This unit is in capability unit IIIe-1, irrigated, and capability subclass VIe, nonirrigated. It is in MLRA 21.

155—Munnell gravelly loam, slightly wet, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 4,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is brown gravelly loam about 5 inches thick. The subsoil is brown, reddish gray, and reddish brown gravelly loam about 27 inches thick. The substratum to a depth of 60 inches or more is reddish brown very gravelly sand.

Included in this unit are small areas of Modoc loam,

Rojo sandy loam, and Truax fine sandy loam. Also included are small areas of soils that are similar to the Munnell soil but are more than 40 inches deep to very gravelly sand or sand. Included areas make up about 10 percent of the total acreage.

Permeability is moderate in the Munnell soil. Available water capacity is low or moderate. The effective rooting depth is 60 inches or more. The seasonal high water table is at a depth of 3.5 to 6.0 feet from January through April. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops and for irrigated hay and pasture.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main limitations are the low or moderate available water capacity and the likelihood that frost will occur during any month of the growing season. The high content of gravel in the soil reduces the amount of moisture available for plant growth. Sprinkler irrigation is the best method of applying water. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage.

If this unit is used for hay and pasture, the main management concern is the seasonal high water table. If the water table persists in spring, it could have a detrimental effect on deep-rooted crops. Grasses and legumes grow well if an adequate amount of fertilizer is applied. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage.

Few limitations affect the use of this unit for windbreaks and environmental plantings. Irrigation is needed when seedlings are planted. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are Scotch pine, Siberian elm, multifora rose, and Russian-olive.

This unit is in capability unit IIIw-0, irrigated, and capability subclass VIw, nonirrigated. It is in MLRA 21.

156—Ocho Variant silt loam, 0 to 2 percent slopes. This shallow, somewhat poorly drained soil is on lake terraces. It formed in lacustrine deposits and alluvium derived from volcanic ash, diatomite, and extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,300 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 40 days. Frost can occur during any month of the year.

Typically, the surface layer is light gray, very slightly saline silt loam about 6 inches thick. The subsoil is light gray, slightly saline, sodic clay about 13 inches thick. Below this to a depth of 60 inches or more is a light brownish gray and very pale brown hardpan.

Included in this unit are small areas of Ocho very fine sandy loam and Inlow silt loam. Included areas make up about 15 percent of the total acreage.

Permeability is slow in the Ocho Variant soil. Available water capacity is very low or low. The effective rooting depth is 14 to 20 inches. Runoff is ponded, and there is no hazard of water erosion. The hazard of soil blowing is moderate. The water table is maintained 0.5 foot above to 1.0 foot below the surface from December through March.

This unit is used as rangeland. The main concerns affecting range management are the hazard of soil blowing, the sodicity, the shallow rooting depth, surface crusting, and the susceptibility of the soil to compaction. The production of forage is limited by the sodicity and the shallow rooting depth. Management practices that overcome the sodicity generally are not feasible. Seeding generally is not feasible. Surface crusting inhibits the infiltration of water. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. The potential plant community is mainly annual hairgrass, bottlebrush squirreltail, and claspingleaf pepperweed.

This unit is in capability subclass VIIw, nonirrigated, and in MLRA 21.

157—Orset sandy loam, 0 to 9 percent slopes. This very deep, well drained soil is on stream terraces. It formed in alluvium derived from mixed extrusive igneous rock and volcanic ash. The native vegetation is mainly mixed conifers, perennial grasses, forbs, and shrubs. Elevation is 4,900 to 5,500 feet. The average annual precipitation is about 25 inches, the average annual air temperature is 44 degrees F, and the average frost-free period is about 60 days. Frost can occur during any month of the year.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, bark, grass blades, and other organic debris about ½ inch thick. The surface layer is grayish brown and pale brown sandy loam about 13 inches thick. The substratum to a depth of 60 inches or more is very pale brown loam.

Included in this unit are small areas of Mojo stony loam, Sheld stony sandy loam, and Pinehurst loam. Included areas make up about 10 percent of the total acreage.

Permeability is moderately slow in the Orset soil because of the weak cementation in the lower part of the profile. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

This unit is used for woodland and livestock grazing.

Ponderosa pine, Douglas-fir, and white fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index is 76 for ponderosa pine. The potential annual production of ponderosa pine is about 33 cubic feet, or 171 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees.

Seedling mortality and plant competition are the main concerns affecting timber production. After the trees are harvested, carefully managed reforestation helps to control competition from undesirable understory plants. Unless the site is adequately prepared, this competition can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls the subsequent growth of competing plants. Examples of suitable trees are Douglas-fir and ponderosa pine.

Where this unit is used for livestock grazing, the forest canopy is less than 40 percent. The characteristic understory plant community is mainly antelope bitterbrush, rabbitbrush, bottlebrush squirreltail, and needlegrass.

This unit is in capability unit IVe-1, nonirrigated, and in MLRA 22.

158—Pinehurst-Kalo complex, 5 to 15 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers, perennial grasses, forbs, and shrubs. Elevation is 4,400 to 6,500 feet. The average annual precipitation is about 25 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

This unit is about 50 percent Pinehurst soil and 35 percent Kalo soil.

Included in this unit are small areas of Mojo stony loam, Searles very stony loam, and Sheld stony loam. Also included are small areas of Dunnlake and Lequieu very stony loams. Included areas make up about 15 percent of the total acreage.

The Pinehurst soil is deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. Also, about 10 percent of the surface is covered with stones and cobbles. The surface layer is brown stony sandy loam about 15 inches thick. The upper 14 inches of the subsoil is brown gravelly loam. The lower 26 inches is light brown gravelly loam and very stony loam. Soft bedrock is at a depth of about 55 inches.

Permeability is moderately slow in the Pinehurst soil. Available water capacity is moderate. The effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is slight.

The Kalo soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. Also, about 25 percent of the surface is covered with stones and cobbles. The surface layer is brown stony sandy loam about 5 inches thick. The upper 6 inches of the subsoil is brown very cobbly loam. The lower 16 inches is brown very cobbly clay loam. Hard bedrock is at a depth of about 27 inches.

Permeability is moderately slow in the Kalo soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for woodland and livestock grazing.

Ponderosa pine, Douglas-fir, incense cedar, and white fir are the main tree species on this unit. On the basis of a 100-year site curve, the mean site index for ponderosa pine is 92 on the Pinehurst soil and 71 on the Kalo soil. The potential annual production of ponderosa pine on the Pinehurst soil is about 56 cubic feet, or 290 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees. The potential annual production of ponderosa pine on the Kalo soil is about 26 cubic feet, or 138 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees.

The main concerns affecting timber production and harvesting are seedling mortality and plant competition. Proper site preparation controls initial plant competition, and spraying, cutting, or girdling controls the subsequent growth of competing plants. Unless the site is adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. The available water capacity of the Kalo soil reduces the seedling survival rate. Examples of suitable trees are ponderosa pine and Douglas-fir.

Where this unit is used for livestock grazing, the forest canopy is less than 40 percent. The characteristic understory plant community is mainly manzanita, squawcarpet, western serviceberry, and ceanothus on the Pinehurst soil and manzanita, squawcarpet, bottlebrush squirreltail, and Nevada bluegrass on the Kalo soil.

The Pinehurst soil is in capability unit IVs-7, nonirrigated, and the Kalo soil is in capability subclass VIe, nonirrigated. Both soils are in MLRA 22.

159—Pit silty clay, 0 to 2 percent slopes. This very deep, artificially drained soil is on flood plains. It is protected by dikes and levees. The water table is controlled by pumping from deep lateral drains. The soil formed in poorly drained alluvium derived from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 4,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is dark gray silty clay about 26 inches thick. The upper 5 inches of the substratum is gray, slightly saline clay loam. The lower part to a depth of 60 inches or more is light brownish gray and grayish brown, very slightly saline silt loam.

Included in this unit are small areas of Teeters silt loam and Modoc loam. Included areas make up about 5 percent of the total acreage.

Permeability is slow in the Pit soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The water table is maintained at a depth of 5 to 6 feet from December through May. This soil is subject to brief flooding from January through May unless it is protected by dikes and levees.

This unit is used for cultivated crops and rangeland.

If this unit is used for irrigated or nonirrigated wheat or barley, the main management concerns are the fine texture of the soil and the slow permeability. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the rate of water intake. Furrow, border, and sprinkler irrigation systems are suitable on this unit. Because of the slow permeability, the application rate should be regulated so that water does not stand on the surface and damage the crops.

The main concerns affecting range management are a high shrink-swell potential and the susceptibility of the soil to compaction. The species that can withstand the shrinking and swelling of the soil should be selected for seeding. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. The potential plant community is mainly silver sagebrush, basin wildrye, and beardless wildrye.

The unit is in capability units IIIw-5, irrigated, and IVw-5, nonirrigated. It is in MLRA 21.

160—Podus loamy fine sandy, 0 to 2 percent slopes. This shallow, artificially drained soil is on terraces. It is protected from flooding by dikes and levees. The water table is controlled by pumping from deep lateral drains. The soil formed in somewhat poorly drained alluvium derived from tuff, basalt, diatomite, and volcanic ash. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,035 to 4,050 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is light brownish gray loamy fine sand about 12 inches thick. The subsoil is light gray loamy fine sand about 6 inches thick. The next 16 inches is a white hardpan that has medium, distinct, dark yellowish brown mottles. The underlying material to a depth of 60 inches or more is white fine sandy loam that has fine, distinct, dark yellowish brown mottles.

Included in this unit are small areas of Laki fine sandy loam and soils that are similar to the Podus soil but are less than 10 inches deep to a hardpan. Included areas make up about 10 percent of the total acreage.

Permeability is moderately rapid in the Podus soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. The water table is maintained at a depth of 1.5 to 4.0 feet from May through September.

This unit is used for cultivated crops and for hay and pasture.

If this unit is used for irrigated wheat, barley, or oats, the main management concerns are the hazard of soil blowing, droughtiness, and the restricted depth to a hardpan. Soil blowing can be controlled by keeping the soil rough and cloddy when it is not protected by vegetation. Because the rate of water intake is rapid, sprinkler irrigation is the best method of applying water. Because the soil is droughty, applications of water should be light and frequent. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Subsoiling increases the rooting depth.

If this unit is used for irrigated hay and pasture, the main management concerns are the low available water capacity, the restricted depth to a hardpan, and the high water table. Irrigation water should be applied at a rate that ensures optimum production without increasing the risk of deep percolation, the runoff rate, or the hazard of erosion. Ripping and shattering the hardpan can

increase the effective rooting depth and improve the internal drainage. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Sprinkler irrigation is the best method of applying water. If this soil is ripped, a high water table that persists in spring could have a detrimental effect on deep-rooted crops.

If this unit is used for windbreaks and environmental plantings, the main management concerns are droughtiness in the surface layer and the restricted depth to a hardpan. The droughtiness of the surface layer increases the seedling mortality rate. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are Scotch pine, Siberian elm, Russian-olive, and multiflora rose.

This unit is in capability unit IV-w8, irrigated, and in MLRA 21.

161—Poe loamy fine sand, 0 to 2 percent slopes. This moderately deep, artificially drained soil is on terraces. It is protected from flooding by dikes and levees. The water table is controlled by pumping from deep lateral drains. The soil formed in somewhat poorly drained alluvial and lacustrine sediment derived from tuff, basalt, diatomite, and volcanic ash. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,035 to 4,050 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is light brownish gray loamy fine sand about 12 inches thick. The upper 20 inches of the underlying material is light gray loamy fine sand. The lower part to a depth of 60 inches or more is a white hardpan.

Included in this unit are small areas of Laki fine sandy loam and soils that are similar to the Poe soil but are less than 20 inches deep to a hardpan. Included areas make up about 10 percent of the total acreage.

Permeability is moderately rapid in the Poe soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. The water table is maintained at a depth of 2 to 4 feet from May through September.

This unit is used for cultivated crops and for hay and pasture.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the hazard of soil blowing, droughtiness, and the likelihood that frost will occur during any month of the growing season. Soil blowing can be controlled by keeping the soil rough and cloddy when it is not protected by vegetation. Because the rate of water intake is rapid, sprinkler irrigation is the best method of applying water. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Because the soil is droughty, applications of water should be light and frequent. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. The organic matter content can be maintained by returning all crop residue to the soil, plowing cover crops under, and using a suitable crop rotation.

If this unit is used for irrigated hay and pasture, the main management concerns are the low available water capacity, the restricted depth to a hardpan, and the seasonal high water table. Irrigation water should be applied at a rate that ensures optimum production without increasing the risk of deep percolation, the runoff rate, or the hazard of erosion. Ripping and shattering the hardpan can increase the effective rooting depth and improve the internal drainage. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Sprinkler irrigation is the best method of applying water. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

If this unit is used for windbreaks and environmental plantings, the main management concern is droughtiness. The droughtiness of the surface layer increases the seedling mortality rate. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are ponderosa pine, black locust, Russian-olive, and multiflora rose.

This unit is in capability unit IIIw-8, irrigated, and in MLRA 21.

162—Poman loamy sand, 0 to 2 percent slopes. This moderately deep, somewhat excessively drained soil is on alluvial plains and terraces. It formed in alluvium derived from extrusive igneous rock and

Figure 4.—Irrigated barley on Poman loamy sand, 0 to 2 percent slopes. Mount Shasta is in the background.

volcanic ash. Elevation is 4,100 to 4,300 feet. The average annual precipitation is about 11 inches, the average annual air temperature is 46 degrees F, and the average frost-free period is about 40 days. Frost can occur during any month of the year.

Typically, the surface layer is light brownish gray loamy sand about 10 inches thick. The subsoil is light brownish gray loamy sand about 19 inches thick. The next layer is a light yellowish brown and pale brown duripan about 10 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray and pale brown, very slightly saline sand.

Included in this unit are small areas of Fordney loamy fine sand, Truax fine sandy loam, and Doel sandy loam. Included areas make up about 10 percent of the total acreage.

Permeability is rapid in the Poman soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

This unit is used for cultivated crops, hay and pasture, and rangeland.

If this unit is used for irrigated wheat, barley (fig. 4), oats, or potatoes, the main management concerns are

the hazard of soil blowing, the restricted depth to a hardpan, droughtiness, and the likelihood that frost will occur during any month of the growing season. Soil blowing can be controlled by applying a system of conservation tillage and by keeping the soil rough and cloddy when it is not protected by vegetation. Ripping and shattering the hardpan can increase the effective rooting depth and improve the internal drainage.

Because the rate of water intake is rapid, sprinkler irrigation is the best method of applying water. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Because the soil is droughty, applications of water should be light and frequent. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. The organic matter content can be maintained by returning all crop residue to the soil, plowing cover crops under, and using a suitable crop rotation.

If this unit is used for irrigated hay and pasture, the main management concerns are the low available water capacity and the restricted depth to a hardpan. Irrigation water should be applied at a rate that ensures optimum production without increasing the risk of deep percolation. Ripping and shattering the hardpan can increase the effective rooting depth and improve the internal drainage. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Sprinkler irrigation is the best method of applying water.

The main concerns affecting range management are the hazard of soil blowing and the low available water capacity. Seeding disturbed areas to native or tame pasture plants helps to control soil blowing. The sandy texture reduces the amount of water available to plants. The species that can withstand droughtiness should be selected for seeding. The potential plant community is mainly basin wildrye, Indian ricegrass, Thurber needlegrass, and basin big sagebrush.

If this unit is used for windbreaks and environmental plantings, the main management concern is droughtiness. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are ponderosa pine, black locust, Russian-olive, and multiflora rose.

This unit is in capability unit IVe-1, irrigated, and capability subclass VIe, nonirrigated. It is in MLRA 21.

163—Rangee Variant-Dotta complex, 0 to 2 percent slopes. This map unit is on alluvial fans and terraces. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 4,800 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

This unit is about 50 percent Rangee Variant clay loam and 40 percent Dotta sandy loam. The Rangee Variant soil is in depressional areas, and the Dotta soil is on mounds.

Included in this unit are small areas of Pit silty clay and Modoc loam. Included areas make up about 10 percent of the total acreage.

The Rangee Variant soil is shallow and somewhat poorly drained. It formed in alluvium derived from various kinds of extrusive igneous rock. Typically, the surface layer is gray clay loam about 3 inches thick. The subsoil is gray clay about 13 inches thick. The next layer is a very pale brown hardpan about 19 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown, very slightly saline sandy loam.

Permeability is slow in the Rangee Variant soil. Available water capacity is very low or low. The effective rooting depth is 12 to 20 inches. Runoff is very slow, and the hazard of water erosion is slight. The seasonal high water table fluctuates between 0.5 foot above and 1.0 foot below the surface from December through March.

The Dotta soil is very deep and well drained. It formed in alluvium derived from various kinds of extrusive igneous rock. Typically, the surface layer is grayish brown sandy loam about 15 inches thick. The subsoil is grayish brown and brown loam about 15 inches thick. The substratum to a depth of 60 inches or more is brown sandy loam.

Permeability is moderately slow in the Dotta soil. Available water capacity is moderate or high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for cultivated crops and for hay and pasture.

If this unit is used for irrigated wheat, the main management concerns are the hazard of ponding and restricted depth to a hardpan in areas of the Rangee Variant soil and the hazard of soil blowing in areas of the Dotta soil. Ripping and shattering the hardpan can increase the effective rooting depth and improve the internal drainage. Because of the slow permeability in the Rangee Variant soil, the application rate should be regulated so that water does not stand on the surface and damage the crops. Soil blowing can be controlled

by returning crop residue to the soil and applying a system of conservation tillage.

If this unit is used for irrigated hay and pasture, the main management concerns are the hazard of ponding and restricted depth to a hardpan in areas of the Rangee Variant soil. There are few limitations in areas of the Dotta soil. The wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. The cemented pan reduces the yield of deep-rooted plants. Where feasible, deep ripping of the cemented pan helps to overcome this limitation. Carefully applying irrigation helps to prevent the buildup of a high water table. A drainage system may be needed.

The Rangee Variant soil is in capability units IVs-8, irrigated, and VIs-8, nonirrigated. The Dotta soil is in capability units IIIe-1, irrigated, and IVe-1, nonirrigated. Both soils are in MLRA 21.

164—Rojo sandy loam, 0 to 2 percent slopes. This moderately deep, well drained soil is on terraces. It formed in material weathered from tuff and volcanic ash. Slopes are slightly convex. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,035 to 4,600 feet. The average annual precipitation is 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is brown sandy loam about 13 inches thick. The subsoil is pinkish gray and light reddish brown sandy loam about 15 inches thick. A pink hardpan is at a depth of about 28 inches. Soft bedrock is at a depth of about 30 inches.

Included in this unit are small areas of Modoc loam, Dehill fine sandy loam, and Fordney loamy fine sand. Also included are small areas of soils that are similar to the Rojo soil but have a duripan at a depth of more than 40 inches. Included areas make up about 15 percent of the total acreage.

Permeability is moderately rapid in the Rojo soil. Available water capacity is low or moderate. The effective rooting depth is 25 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for cultivated crops, hay and pasture, and rangeland.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the hazard of soil blowing, the restricted depth to a hardpan, the low or moderate available water capacity, and the likelihood that frost will occur during any month of the growing season. Soil blowing can be controlled by returning crop residue to the soil and applying a system of conservation tillage. Ripping of the hardpan is not feasible because of the limited depth to tuff. Sprinkler irrigation is the best method of applying water. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. Good management of irrigation helps to prevent the development of a temporary water table above the hardpan. Applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil.

If this unit is used for irrigated hay and pasture, the main management concern is the restricted depth to a hardpan. The cemented pan reduces the yield of deep-rooted plants. Ripping of the hardpan is not feasible because of the limited depth to tuff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Sprinkler irrigation is the best method of applying water. Good management of irrigation water helps to prevent the development of a temporary water table above the hardpan. Applications of water should be adjusted to the available water capacity and rate of water intake in the soil.

Few limitations affect range management. This unit responds well to range seeding and to proper grazing use. The potential plant community is mainly Thurber needlegrass, bluebunch wheatgrass, western needlegrass, and mountain big sagebrush.

If this unit is used for windbreaks and environmental plantings, the main management concern is the restricted depth to a hardpan. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are ponderosa pine, black locust, American plum, and Tatarian honeysuckle.

This unit is in capability unit IIIe-8, irrigated, and capability subclass VIe, nonirrigated. It is in MLRA 21.

165—Rojo sandy loam, 2 to 9 percent slopes. This moderately deep, well drained soil is on terraces. It formed in material weathered from tuff and volcanic ash. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,035 to 4,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is brown sandy loam about 13 inches thick. The subsoil is pinkish gray and light reddish brown sandy loam about 15 inches thick. A pink hardpan is at a depth of about 28 inches. Soft bedrock is at a depth of about 30 inches.

Included in this unit are small areas of Stukel sandy loam, Eastable loam, and Hedox loam. Also included are small areas of Modoc loam, Dehill fine sandy loam, and Fordney loamy sand. Included areas make up about 10 percent of the total acreage.

Permeability is moderately rapid in the Rojo soil. Available water capacity is low or moderate. The effective rooting depth is 25 to 40 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate. The hazard of soil blowing is moderate.

This unit is used for cultivated crops, hay and pasture, and rangeland.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the hazard of water erosion, the hazard of soil blowing, the restricted depth to a hardpan, and the likelihood that frost will occur during any month of the growing season. The risk of sheet and rill erosion in the steeper areas can be reduced by farming on the contour or across the slope. Soil blowing can be controlled by returning crop residue to the soil and applying a system of conservation tillage. Ripping of the hardpan is not feasible because of the limited depth to tuff.

Sprinkler irrigation systems are suitable on this unit. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil.

If this unit is used for hay and pasture, the main management concern is the restricted depth to a hardpan. The cemented pan reduces the yield of deep-rooted plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Irrigation water can be applied by the sprinkler method.

Few limitations affect range management. This unit responds well to range seeding and to proper grazing use. The potential plant community is mainly Thurber needlegrass, western needlegrass, bluebunch wheatgrass, and mountain big sagebrush.

If this unit is used for windbreaks and environmental plantings, the main management concern is the restricted depth to a hardpan. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are ponderosa pine, black locust, American plum, and Tatarian honeysuckle.

This unit is in capability unit IIIe-l, irrigated, and capability subclass VIe, nonirrigated. It is in MLRA 21.

166—Rubble land. This map unit is on mountains. Slope is 15 to 75 percent. Elevation is 4,500 to 6,500 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

This unit consists of areas of basalt or andesite cobbles, stones, and boulders. It generally is barren, but some grasses and brush grow at the edge of the areas, where water runs off and where the boulders, stones, and cobbles are not so close together.

Included in this unit are small areas of shallow and very shallow soils having various textures. Included areas make up about 10 percent of the total acreage.

This unit is used for wildlife habitat and watershed. It provides habitat for such wildlife species as rodents and birds of prey.

This unit is in capability subclass VIIIs, nonirrigated, and in MLRA 21.

167—Salisbury-Denbar complex, 0 to 9 percent slopes. This map unit is on terraces. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 4,800 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

This unit is about 45 percent Salisbury cobbly loam and 35 percent Denbar clay loam.

Included in this unit are small areas of Dotta sandy loam and Lorella very stony loam. Also included are small areas of soils that have more than 35 percent rock fragments and soils that have a hardpan within a depth of 20 inches. Included areas make up about 20 percent of the total acreage.

The Salisbury soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 10 percent of the surface is covered with cobbles. The surface layer is grayish brown cobbly loam about 9 inches thick. The subsoil is about 14 inches of brown gravelly clay loam and gravelly clay. Below this to a depth of 60 inches or more is a reddish yellow, white, and brown hardpan.

Permeability is slow in the Salisbury soil. Available

water capacity is low or moderate. The effective rooting depth is 20 to 40 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

The Denbar soil is deep and well drained. It formed in alluvium derived from rhyolite, tuff, basalt, and other kinds of extrusive igneous rock. Typically, about 2 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown clay loam about 8 inches thick. The upper 14 inches of the subsoil is grayish brown and brown clay. The lower 7 inches is brown clay loam. The substratum is pale brown and very pale brown sandy loam about 19 inches thick. Below this is a light yellowish brown hardpan about 12 inches thick.

Permeability is slow in the Denbar soil. Available water capacity is moderate or high. The effective rooting depth is 40 to 60 inches. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

This unit is used as rangeland. Few limitations affect range management on the Salisbury soil. The main concern in areas of the Denbar soil is the depth to a layer of clay. The production of vegetation on the Denbar soil is limited by the shallow rooting depth. The species that can withstand droughtiness should be selected for seeding. The potential plant community is mainly bluebunch wheatgrass, Idaho fescue, Thurber needlegrass, and mountain big sagebrush on the Salisbury soil and bluebunch wheatgrass, low sagebrush, and Thurber needlegrass on the Denbar soil.

This unit is in capability unit IVe-3, nonirrigated, and in MLRA 21.

168—Searles-Dunnlake complex, 15 to 30 percent slopes. This map unit is on mountain side slopes. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days.

This unit is about 50 percent Searles soil and 40 percent Dunnlake soil.

Included in this unit are small areas of Orhood very cobbly loam, Truax fine sandy loam, and Bucklake loam. Also included are small areas of Capona cobbly loam. Included areas make up about 10 percent of the total acreage.

The Searles soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 25 percent of the surface is covered with stones and cobbles. The surface layer is dark grayish brown very stony loam about 10 inches thick. The upper 6 inches of the subsoil is dark grayish brown very cobbly loam. The lower 12 inches is brown very cobbly clay loam and very cobbly loam. Hard bedrock is at a depth of about 28 inches.

Permeability is moderately slow in the Searles soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Dunnlake soil is shallow and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 25 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown very stony loam about 4 inches thick. The upper 3 inches of the subsoil is grayish brown clay loam. The lower 9 inches is brown and yellowish brown gravelly clay. Hard bedrock is at a depth of about 16 inches.

Permeability is slow in the Dunnlake soil. Available water capacity is very low or low. The effective rooting depth is 12 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used as rangeland. The main concerns affecting range management are the stones on and below the surface of both soils and the restricted depth to bedrock in the Dunnlake soil. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage is limited by the shallow rooting depth in the Dunnlake soil and by the stoniness of the Searles soil. The high content of gravel, stones, and cobbles in the Searles soil reduces the amount of moisture available for plant growth. Building fences is difficult on these stony or shallow soils. As a result, special design is needed.

Western juniper readily invades areas of these soils. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly bluebunch wheatgrass, Antelope bitterbrush, and mountain big sagebrush on the Searles soil and bluebunch wheatgrass, Thurber needlegrass, and low sagebrush on the Dunnlake soil.

Where this unit has been invaded by western juniper, the site index is 22 on the Searles soil and 21 on the Dunnlake soil, on the basis of a 50-year site index. The Searles soil can produce 919 cubic feet of wood per acre in a stand of trees that average 80 square feet in

the basal area and 11.3 inches in diameter at breast height. The Dunnlake soil can produce 671 cubic feet of wood per acre in a stand of trees that average 58 square feet in the basal area and 13.2 inches in diameter of breast height. The stoniness and the slope limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

The Dunnlake soil is in capability subclass VIIs, nonirrigated, and the Searles soil is in capability subclass VIs, nonirrigated. Both soils are in MLRA 21.

169—Searles-Dunnlake complex, 30 to 50 percent slopes. This map unit is on mountain side slopes. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,100 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days.

This unit is about 50 percent Searles soil and 40 percent Dunnlake soil.

Included in this unit are small areas of Orhood very cobbly loam and Capona cobbly loam. Also included are small areas of Rubble land. Included areas make up about 10 percent of the total acreage.

The Searles soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 25 percent of the surface is covered with stones and cobbles. The surface layer is dark grayish brown very stony loam about 10 inches thick. The upper 6 inches of the subsoil is dark grayish brown very cobbly loam. The lower 12 inches is brown very cobbly clay loam and very cobbly loam. Hard bedrock is at a depth of about 28 inches.

Permeability is moderately slow in the Searles soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Dunnlake soil is shallow and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 25 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown very stony loam about 4 inches thick. The upper 3 inches of the subsoil is grayish brown clay loam. The lower 9 inches is brown and yellowish brown gravelly clay. Hard bedrock is at a depth of about 16 inches.

Permeability is slow in the Dunnlake soil. Available water capacity is very low or low. The effective rooting depth is 12 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used as rangeland. The main concerns affecting range management are the slope and stones on and below the surface of both soils and the restricted depth to bedrock in the Dunnlake soil. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage is limited by the shallow rooting depth in the Dunnlake soil and the stoniness of the Searles soil. The high content of gravel, stones, and cobbles in the Searle soil reduces the amount of moisture available for plant growth. Building fences is difficult on these stony soils or shallow soils. As a result, special design is needed. The slope limits access by livestock and can result in overgrazing of the less sloping areas. Livestock distribution can be improved by properly located fences and livestock watering facilities. Onsite investigation is needed to determine the feasibility of mechanical treatment.

Western juniper readily invades areas of these soils. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where juniper has increased in abundance, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly bluebunch wheatgrass, Antelope bitterbrush, and mountain big sagebrush on the Searles soil and bluebunch wheatgrass, Thurber needlegrass, and low sagebrush on the Dunnlake soil.

Where this unit has been invaded by western juniper, the site index is 22 on the Searles soil and 21 on the Dunnlake soil, on the basis of a 50-year site index. The Searles soil can produce 919 cubic feet of wood per acre in a stand of trees that average 80 square feet in the basal area and 11.3 inches in diameter at breast height. The Dunnlake soil can produce 671 cubic feet of wood per acre in a stand of trees that average 58 square feet in the basal area and 13.2 inches in diameter at breast height. The slope and the stoniness limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

This unit is in capability subclass VIIs, nonirrigated, and in MLRA 21.

170—Searles-Orhood complex, 15 to 30 percent slopes. This map unit is on mountains. The native vegetation is mainly perennial grasses, forbs, shrubs, and western juniper. Elevation is 4,200 to 4,800 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

This unit is about 50 percent Searles very stony loam and 35 percent Orhood very cobbly loam.

Included in this unit are small areas of Capona cobbly loam, Rock outcrop, and soils that are similar to the Searles and Orhood soils but have a clayey subsoil. Also included are small areas of soils that are similar to the Searles soil but are more than 40 inches deep over bedrock; soils that are similar to the Orhood soil but are less than 10 inches deep over bedrock; and, in the northwest corner of the survey area, soils that are similar to the Searles and Orhood soils but receive more precipitation. Included areas make up about 15 percent of the total acreage.

The Searles soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 25 percent of the surface is covered with stones and cobbles. The surface layer is dark grayish brown very stony loam about 10 inches thick. The upper 6 inches of the subsoil is dark grayish brown very cobbly loam. The lower 12 inches is brown very cobbly clay loam and very cobbly loam. Hard bedrock is at a depth of about 28 inches.

Permeability is moderately slow in the Searles soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Orhood soil is shallow and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 45 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown very cobbly loam about 4 inches thick. The upper 4 inches of the subsoil is grayish brown very cobbly loam, and the lower 8 inches is grayish brown, yellowish brown, and light yellowish brown very cobbly clay loam and very cobbly loam. Hard bedrock is at a depth of about 16 inches.

Permeability is moderately slow in the Orhood soil. Available water capacity is very low. The effective rooting depth is 14 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for rangeland and the production of western juniper.

The main concern affecting range management on the Searles soil is the stones on and below the surface. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage on the Searles soil is limited by stoniness. The high content of gravel, stones, and cobbles in this soil reduces the amount of moisture available for plant growth. Building fences is difficult on this stony soil. As a result, special design is needed.

Western juniper readily invades areas of this unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community on the Searles soil is mainly bluebunch wheatgrass, Antelope bitterbrush, and mountain big sagebrush.

Where the Searles soil has been invaded by western juniper, the mean site index is 22, on the basis of a 50-year site index. The soil can produce 919 cubic feet of wood per acre in a stand of trees that average 80 square feet in the basal area and 11.3 inches in diameter at breast height. The stoniness and the slope limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

Where the Orhood soil supports western juniper, the mean site index is 26, on the basis of a 50-year site index. The soil can produce 703 cubic feet of wood per acre in a stand of trees that average 56 square feet in the basal area and 14.8 inches in diameter at breast height. The stoniness and the slope limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

Where the density of the woodland canopy is less than 40 percent, the Orhood soil produces a limited grazeable understory. Properly managing livestock grazing helps to control erosion. The characteristic understory plant community on this soil is mainly Idaho fescue, bluebunch wheatgrass, rabbitbrush, and bottlebrush squirreltail.

The Searles soil is in capability subclass VIe, nonirrigated, and the Orhood soil is in capability subclass VIIe, nonirrigated. Both soils are in MLRA 21.

171—Searles-Orhood complex, 30 to 50 percent slopes. This map unit is on mountains. The native vegetation is mainly perennial grasses, forbs, shrubs, and western juniper. Elevation is 4,200 to 5,500 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 65 days. Frost can occur during any month of the year.

This unit is about 50 percent Searles very stony loam and 35 percent Orhood very cobbly loam.

Included in this unit are small areas of Capona cobbly loam, Rock outcrop, and soils that are similar to the Searles and Orhood soils but have a clayey subsoil. Also included are small areas of soils that are similar to the Searles soil but are more than 40 inches deep over bedrock; soils that are similar to the Orhood soil but are less than 10 inches deep over bedrock; and, in the northwest corner of the survey area, soils that are similar to the Searles and Orhood soils but receive more precipitation. Included areas make up about 15 percent of the total acreage.

The Searles soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 25 percent of the surface is covered with stones and cobbles. The surface layer is dark grayish brown very stony loam about 10 inches thick. The upper 6 inches of the subsoil is dark grayish brown very cobbly loam. The lower 12 inches is brown very cobbly clay loam and very cobbly loam. Hard bedrock is at a depth of about 28 inches.

Permeability is moderately slow in the Searles soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe.

The Orhood soil is shallow and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 45 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown very cobbly loam about 4 inches thick. The upper 4 inches of the subsoil is grayish brown very cobbly loam, and the lower 8 inches is grayish brown, yellowish brown, and light yellowish brown very cobbly clay loam and very cobbly loam. Hard bedrock is at a depth of about 16 inches.

Permeability is moderately slow in the Orhood soil. Available water capacity is very low. The effective rooting depth is 14 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used for rangeland and the production of western juniper.

The main concerns affecting range management on the Searles soil are the slope and the stones on and below the surface. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage on the Searles soil is limited by stoniness. The high content of gravel, stones, and cobbles in this soil reduces the amount of moisture available for plant growth. Building fences is difficult on this stony soil. As a result, special design is needed. The slope limits access by livestock and can result in overgrazing of the less sloping areas. Livestock distribution can be improved by properly located fences and livestock watering facilities. Onsite investigation is needed to determine the feasibility of mechanical treatment.

Western juniper readily invades areas of this unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community on the Searles soil is mainly bluebunch wheatgrass, Antelope bitterbrush, and mountain big sagebrush.

Where the Searles soil has been invaded by western juniper, the mean site index is 22, on the basis of a 50-year site index. The soil can produce 919 cubic feet of wood per acre in a stand of trees that average 80 square feet in the basal area and 11.3 inches in diameter at breast height. The slope and the stoniness limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

Where the Orhood soil supports western juniper, the mean site index is 26, on the basis of a 50-year site index. The soil can produce 703 cubic feet of wood per acre in a stand of trees that average 56 square feet in the basal area and 14.8 inches in diameter at breast height. The slope and the stoniness limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

Where the density of the woodland canopy is less than 40 percent, the Orhood soil produces a limited grazeable understory. Properly managing livestock grazing helps to control erosion. The characteristic understory plant community on this soil is mainly Idaho

fescue, bluebunch wheatgrass, rabbitbrush, and bottlebrush squirreltail.

This unit is in capability subclass VIIe, nonirrigated, and in MLRA 21.

172—Searles-Rubble land complex, 50 to 75 percent slopes. This map unit is on mountains. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 5,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

This unit is about 50 percent Searles very stony loam and 35 percent Rubble land.

Included in this unit are small areas of Orhood very cobbly loam and soils that are similar to the Searles soil but are more than 40 inches deep over bedrock. Also included are small areas of Capona cobbly loam and Rock outcrop. Included areas make up about 15 percent of the total acreage.

The Searles soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 25 percent of the surface is covered with stones and cobbles. The surface layer is dark grayish brown very stony loam about 10 inches thick. The upper 6 inches of the subsoil is dark grayish brown very cobbly loam. The lower 12 inches is brown very cobbly clay loam and very cobbly loam. Hard bedrock is at a depth of about 28 inches.

Permeability is moderately slow in the Searles soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe.

Rubble land consists of areas where 90 percent or more of the surface is covered with stones and boulders, which generally are underlain by bedrock.

This unit is used as rangeland. The main concerns affecting range management on the Searles soil are the slope and the stones on and below the surface. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage on the Searles soil is limited by stoniness. The high content of gravel, stones, and cobbles in this soil reduces the amount of moisture available for plant growth. Building fences is difficult on this stony soil. As a result, special design is needed. The slope limits access by livestock and can result in overgrazing of the less sloping areas. Livestock distribution can be improved by properly located fences and livestock watering facilities.

Western juniper readily invades areas of this unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community on the Searles soil is mainly bluebunch wheatgrass, Antelope bitterbrush, and mountain big sagebrush.

Where the Searles soil has been invaded by western juniper, the mean site index is 22, on the basis of a 50-year site index. The soil can produce 919 cubic feet of wood per acre in a stand of trees that average 80 square feet in the basal area and 11.3 inches in diameter at breast height. The slope and the stoniness limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

The Searles soil is in capability subclass VIIs, nonirrigated, and the Rubble land is in capability subclass VIIIs, nonirrigated. Both are in MLRA 21.

173—Searles-Truax-Orhood complex, 2 to 15 percent slopes. This map unit is on hills and alluvial fans. The native vegetation is mainly perennial grasses, forbs, shrubs, and western juniper (fig. 5). Elevation is 4,200 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

This unit is about 40 percent Searles very stony loam, 25 percent Truax fine sandy loam, and 20 percent Orhood very cobbly loam. The Searles and Orhood soils are on hills, and the Truax soil is on alluvial fans.

Included in this unit are small areas of Capona cobbly loam and Dehill fine sandy loam. Also included are small areas of soils that are similar to the Truax soil but are 20 to 40 inches deep over bedrock. Included areas make up about 15 percent of the total acreage.

The Searles soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 25 percent of the surface is covered with stones and cobbles. The surface layer is dark grayish brown very stony loam about 10 inches thick. The upper 6 inches of the subsoil is dark grayish brown very cobbly loam. The lower 12 inches is brown very cobbly clay loam and very cobbly loam. Hard bedrock is at a depth of about 28 inches.

Figure 5.—An area of Searles-Truax-Orhood complex, 2 to 15 percent slopes. The Truax soil is in the foreground, and Searles and Orhood soils are in areas of western juniper trees.

Permeability is moderately slow in the Searles soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Truax soil is very deep and well drained. It formed in mixed alluvium derived from extrusive igneous rock. Typically, about 2 percent of the surface is covered with stones and cobbles. The surface layer is brown fine sandy loam about 8 inches thick. The subsoil is brown sandy clay loam about 21 inches thick. The upper 7 inches of the substratum is yellowish brown sandy loam. The lower part to a depth of 60 inches or more is yellowish brown and brown, weakly cemented sandy loam.

Permeability is moderately slow in the Truax soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

The Orhood soil is shallow and well drained. It

formed in material weathered from extrusive igneous rock. Typically, about 20 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown very cobbly loam about 4 inches thick. The upper 4 inches of the subsoil is grayish brown very cobbly loam, and the lower 8 inches is grayish brown, yellowish brown, and light yellowish brown very cobbly clay loam and very cobbly loam. Hard bedrock is at a depth of about 16 inches.

Permeability is moderately slow in the Orhood soil. Available water capacity is very low. The effective rooting depth is 14 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for rangeland and the production of western juniper.

The main concern affecting range management on the Searles soil is the stones on and below the surface. Soil properties seldom limit range management on the Truax soil. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage on the Searles soil is limited by the stoniness. The high content of gravel, stones, and cobbles in this soil reduces the amount of moisture available for plant growth. Building fences is difficult on this stony soil. As a result, special design is needed.

Western juniper readily invades areas of this unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly bluebunch wheatgrass and mountain big sagebrush on the Searles soil and basin wildrye, bluebunch wheatgrass, Idaho fescue, and mountain big sagebrush on the Truax soil.

Where this unit has been invaded by western juniper, the site index is 22 on the Searles soil and 28 on the Truax soil, on the basis of a 50-year site index. The Searles soil can produce 919 cubic feet of wood per acre in a stand of trees that average 80 square feet in the basal area and 11.3 inches in diameter at breast height. The Truax soil can produce 664 cubic feet of wood per acre in a stand of trees that average 53 square feet in the basal area and 12.4 inches in diameter at breast height. The stoniness of the Searles soil limits the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

Where the Orhood soil supports western juniper, the mean site index is 26, on the basis of a 50-year site index. The soil can produce 703 cubic feet of wood per acre in a stand of trees that average 56 square feet in the basal area and 14.8 inches in diameter at breast height. The stoniness limits the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

Where the density of the woodland canopy is less than 40 percent, the Orhood soil produces a limited grazeable understory. Properly managing livestock grazing helps to control erosion. The characteristic understory plant community on this soil is mainly Idaho fescue, bluebunch wheatgrass, rabbitbrush, and bottlebrush squirreltail.

The Searles soil is in capability subclass VIs, nonirrigated, the Truax soil is in capability subclass VIe, nonirrigated, and the Orhood soil is in capability subclass VIIe, nonirrigated. All three of the soils are in MLRA 21.

174—Searles Variant very stony loam, 0 to 5 percent slopes. This deep, well drained soil is on terraces. It formed in material weathered from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,040 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

Typically, about 30 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown very stony loam about 8 inches thick. The subsoil is about 37 inches of brown very cobbly loam, very cobbly clay loam, and very cobbly clay. Hard bedrock is at a depth of about 45 inches.

Included in this unit are small areas of Demox stony sandy loam and Capjac silt loam. Also included are small areas of Rock outcrop and a soil that is similar to the Searles Variant soil but is poorly drained. Included areas make up about 10 percent of the total acreage.

Permeability is slow in the Searles Variant soil. Available water capacity is low or moderate. The effective rooting depth is 40 to 60 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for wildlife habitat. It also is used as rangeland.

This unit provides habitat for such wildlife species as mule deer, coyotes, marmots, quail, jackrabbits, and birds of prey.

The main concern affecting range management is the stones on and below the surface. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage is limited by the stoniness of the soil. The high content of gravel, stones, and cobbles in the soil reduces the amount of moisture available for plant growth. Building fences is difficult on this stony soil. As a result, special design is needed. The potential plant community is mainly basin wildrye, rabbitbrush, and basin big sagebrush.

This unit is in capability subclass VIs, nonirrigated, and in MLRA 21.

175—Sheld stony sandy loam, 9 to 30 percent slopes. This deep, well drained soil is on mountains. It formed in volcanic ash over material weathered from extrusive igneous rock. The native vegetation is mainly mixed conifers, perennial grasses, forbs, and shrubs. Elevation is 4,500 to 6,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 45 days. Frost can occur during any month of the year.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, bark, grass blades, and other organic debris about 2 inches thick. Also, about 10 percent of the surface is covered with stones and cobbles. The surface layer is about 17 inches of dark grayish brown stony sandy loam and brown gravelly sandy loam. The upper 7 inches of the subsoil is pinkish gray very gravelly sandy loam. The lower 20 inches is pinkish gray very gravelly loam. Soft bedrock is at a depth of about 44 inches.

Included in this unit are small areas of Snell very stony loam, Mojo stony loam, and Pinehurst loam. Included areas make up about 5 percent of the total acreage.

Permeability is moderate in the Sheld soil. Available water capacity is low or moderate. The effective rooting depth is 40 to 60 inches. Runoff is medium or rapid, and the hazard of water erosion is moderate or severe.

This unit is used as woodland. White fir, ponderosa pine, and California red fir are the main tree species. On the basis of a 50-year site curve, the mean site index is 62 for white fir. The potential annual production of white fir is about 88 cubic feet, or 457 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees.

Plant competition is the main concern affecting timber production. Unless the site is adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls the subsequent growth of competing plants. Examples of suitable trees are white fir and ponderosa pine.

The characteristic understory plant community is mainly squawcarpet, manzanita, and bottlebrush squirreltail.

This unit is in capability subclass IVe, nonirrigated, and in MLRA 22.

176—Sheld very stony sandy loam, 50 to 65 percent slopes. This deep, well drained soil is on mountains. It formed in volcanic ash over material weathered from extrusive igneous rock. The native vegetation is mainly mixed conifers, perennial grasses, forbs, and shrubs. Elevation is 4,500 to 6,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 45 days. Frost can occur during any month of the year.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, bark, grass blades, and other organic debris about 2 inches thick. Also, about 10 percent of the surface is covered with stones and cobbles. The surface layer is about 17 inches of dark grayish brown very stony sandy loam and brown gravelly sandy loam. The upper 7 inches of the subsoil is pinkish gray very gravelly sandy loam. The lower 20 inches is pinkish gray very gravelly loam. Soft bedrock is at a depth of about 44 inches.

Included in this unit are small areas of Snell very stony loam, Mojo stony loam, and Pinehurst loam. Included areas make up about 5 percent of the total acreage.

Permeability is moderate in the Sheld soil. Available water capacity is low or moderate. The effective rooting depth is 40 to 60 inches. Runoff is very rapid, and the hazard of water erosion is severe.

This unit is used as woodland. White fir, ponderosa pine, and California red fir are the main tree species. On the basis of a 50-year site curve, the mean site index is 62 for white fir. The potential annual production of white fir is about 88 cubic feet, or 457 board feet (Scribner rule), per acre in a fully stocked, unmanaged stand of trees.

The main concerns affecting timber production and harvesting are the hazard of erosion, equipment limitation, seedling mortality, and plant competition. The slope limits the kinds of equipment that can be used. Minimizing the risk of erosion is essential when timber is harvested. Properly designed road drainage systems and carefully located culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion

and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding areas that have been cut and filled.

Unless the site is adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls the subsequent growth of competing plants. The droughtiness of the surface layer increases the seedling mortality rate, especially on south- and southwest-facing slopes. Examples of suitable trees are white fir and ponderosa pine.

The characteristic understory plant community is mainly squawcarpet, manzanita, and bottlebrush squirreltail.

This unit is in capability subclass VIIe, nonirrigated, and in MLRA 22.

177—Snell very stony loam, 5 to 30 percent slopes. This moderately deep, well drained soil is on mountains. It formed in material weathered from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,400 to 6,500 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, about 25 percent of the surface is covered with stones and cobbles. The surface layer is grayish brown very stony loam about 4 inches thick. The upper 6 inches of the subsoil is brown very cobbly clay loam. The lower 11 inches is brown very cobbly clay. Hard bedrock is at a depth of about 21 inches.

Included in this unit are small areas of Mojo stony loam, Pinehurst loam, Orset sandy loam, and Sheld stony loam. Included areas make up about 10 percent of the total acreage.

Permeability is moderately slow in the Snell soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is medium or rapid, and the hazard of water erosion is moderate or severe.

This unit is used as rangeland. The main concerns affecting range management are the stones on and below the surface and the restricted depth to a layer of clay. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage is limited by the stoniness and the restricted rooting depth. The high content of gravel, stones, and cobbles in this soil reduces the amount of moisture available for plant growth. Building fences is difficult on this stony soil. As a result, special design is needed.

Western juniper readily invades areas of this unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly Idaho fescue, lemon needlegrass, and low sagebrush.

Where this soil has been invaded by western juniper, the mean site index is 27, based on a 50-year site index. The soil can produce 388 cubic feet of wood per acre in a stand of trees that average 30 square feet in the basal area and 14.2 inches in diameter at breast height. The stoniness and the slope limit the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

This unit is in capability subclass VIIs, nonirrigated, and in MLRA 22.

178—Stukel sandy loam, 5 to 30 percent slopes. This shallow, well drained soil is on hills. It formed in material weathered from extrusive igneous rock. The native vegetation is mainly perennial grass, forbs, and shrubs. Elevation is 4,200 to 4,700 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown sandy loam about 6 inches thick. The upper 9 inches of the underlying material is brown sandy loam. The lower 2 inches is pale brown sandy loam. Hard bedrock is at a depth of about 17 inches. In some areas the surface layer is stony sandy loam.

Included in this unit are small areas of Rock outcrop and soils that are similar to the Stukel soil but are less than 10 or more than 20 inches deep over bedrock. Included areas make up about 10 percent of the total acreage.

Permeability is moderate in the Stukel soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium or rapid, and the hazard of water erosion is moderate or severe. The hazard of soil blowing is moderate.

This unit is used as rangeland. The main concerns affecting range management are the hazard of soil

blowing and the restricted depth to bedrock. Seeding disturbed areas to native or tame pasture plants helps to control soil blowing. The production of forage on this unit is limited by the shallow rooting depth. Building fences is difficult on this shallow soil. As a result, special design is needed.

Western juniper readily invades areas of this unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly bluebunch wheatgrass, Thurber needlegrass, western needlegrass, and big sagebrush.

Where this soil has been invaded by western juniper, the mean site index is 29, on the basis of a 50-year site index. The soil can produce 546 cubic feet of wood per acre in a stand of trees that average 44 square feet in the basal area and 16.3 inches in diameter at breast height. The slope limits the accessibility for woodcutting and other activities involving the use of equipment.

This unit is in capability subclass VIe, nonirrigated, and in MLRA 21.

179—Stukel-Capona complex, 2 to 30 percent slopes. This map unit is on pediments. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 4,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 80 days. Frost can occur during any month of the year.

This unit is about 50 percent Stukel sandy loam and 40 percent Capona fine sandy loam.

Included in this unit are small areas of Demox stony sandy loam and Searles very stony loam. Included areas make up about 10 percent of the total acreage.

The Stukel soil is shallow and well drained. It formed in material weathered from extrusive igneous rock. Typically, the surface layer is grayish brown sandy loam about 6 inches thick. The upper 9 inches of the underlying material is brown sandy loam. The lower 2 inches is pale brown sandy loam. Hard bedrock is at a depth of about 17 inches.

Permeability is moderate in the Stukel soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of soil blowing is moderate.

The Capona soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, the surface layer is grayish brown fine sandy loam about 10 inches thick. The subsoil is brown loam about 24 inches thick. Hard bedrock is at a depth of about 34 inches.

Permeability is moderate in the Capona soil. Available water capacity is moderate or high. The effective rooting depth is 20 to 40 inches. Runoff is slow to rapid, and the hazard of water erosion is slight to severe.

This unit is used as rangeland. The main concerns affecting range management on the Stukel soil are the hazard of soil blowing and the restricted depth to bedrock. Soil properties seldom limit range management on the Capona soil. Seeding disturbed areas to native or tame pasture plants helps to control soil blowing. The production of forage on the Stukel soil is limited by the shallow rooting depth. Building fences is difficult on this shallow soil. As a result, special design is needed. The potential plant community is mainly Thurber needlegrass, western needlegrass, and big sagebrush on the Stukel soil and needleandthread, Indian ricegrass, Thurber needlegrass, and big sagebrush on the Capona soil.

This unit is in capability subclass VIe, nonirrigated, and in MLRA 21.

180—Teeters silt loam, 0 to 1 percent slopes. This very deep, artificially drained soil is in lake basins. It formed in poorly drained, silty sediment derived from diatomite, volcanic ash, and extrusive igneous rock. It is protected from flooding by dikes and levees. The water table is controlled by pumping from deep lateral drains. The native vegetation is mainly salt-tolerant grasses and sedges. Elevation is 4,230 to 4,240 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is dark gray silt loam about 10 inches thick. The upper 18 inches of the substratum is light brownish gray silt loam and silt, the next 8 inches is gray silt loam, and the lower part to a depth of 60 inches or more is light gray silt. This soil is slightly saline or moderately saline and sodic throughout.

Included in this unit are small areas of Pit silty clay and Capjac silt loam. Included areas make up about 5 percent of the total acreage.

Permeability is slow in the Teeters soil. Available water capacity is very high because of the influence of diatomite and volcanic ash. The effective rooting depth is 60 inches or more where the soil is artificially drained. The water table is maintained at a depth of 2 to 4 feet throughout the year. Runoff is very slow, and

the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is subject to rare flooding unless it is protected by dikes and levees.

This unit is used for cultivated crops and for hay and pasture.

If this unit is used for irrigated barley, the main management concerns are the hazard of soil blowing, the sodicity, and the high water table. Soil blowing can be controlled by returning crop residue to the soil and applying a system of conservation tillage. Tile or open drains can be used to remove excess water and provide an outlet for leached sodium. The content of sodium can be reduced by applying proper amounts of soil amendments, leaching, and returning crop residue to the soil. The unusually high available water capacity of the soil can delay or inhibit farming in spring. Because drainage outlets are not available, pumps are needed. Many areas are subirrigated by the water table, but this method of irrigation can increase the amount of sodium and salts in the soil. Border and sprinkler irrigation systems are suitable on this unit. Because of the very high available water capacity, the frequency of irrigation can be reduced.

If this unit is used for irrigated hay and pasture, the main management concerns are the sodicity and the high water table. The concentration of sodium in the surface layer limits the production of plants suitable for hay and pasture. Because of the very high available water capacity, the frequency of irrigation can be reduced. Tile or open drains can be used to remove excess water and provide an outlet for leached salts. The content of sodium can be reduced by applying proper amounts of soil amendments, leaching, and returning crop residue to the soil. Salt-tolerant species should be selected for planting. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is in capability unit IIIw-6, irrigated, and in MLRA 21.

181—Truax fine sandy loam, 0 to 5 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium derived from extrusive igneous rock. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, about 2 percent of the surface is covered with stones and cobbles. The surface layer is brown fine sandy loam about 8 inches thick. The subsoil is brown sandy clay loam about 21 inches thick. The upper 7 inches of the substratum is yellowish brown sandy loam. The lower part to a depth of 60 inches or more is yellowish brown and brown, weakly cemented sandy loam.

Included in this unit are small areas of Searles very stony loam and Orhood very cobbly loam. Also included are small areas of soils that are similar to the Truax soil but are sandy loam throughout. Included areas make up about 10 percent of the total acreage.

Permeability is moderately slow in the Truax soil. Available water capacity is moderate or high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used mainly for cultivated crops, hay and pasture, and rangeland.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the hazard of soil blowing and the likelihood that frost will occur during any month of the growing season. Soil blowing can be controlled by returning crop residue to the soil and applying a system of conservation tillage. Flood and sprinkler irrigation methods are suitable on this unit. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil.

Few limitations affect the use of this unit for irrigated hay and pasture. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Irrigation water can be applied by the contour flooding and sprinkler methods.

The main concern affecting range management is the hazard of soil blowing, which can cause deterioration of the existing vegetation. Seeding disturbed areas to native or tame pasture plants helps to control soil blowing. Western juniper readily invades areas of this unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where juniper has increased in abundance, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly basin wildrye, bluebunch wheatgrass, and mountain big sagebrush.

Where this soil has been invaded by western juniper,

the mean site index is 28, on the basis of a 50-year site index. The soil can produce 664 cubic feet of wood per acre in a stand of trees that average 53 square feet in the basal area and 12.4 inches in diameter at breast height. Few limitations affect woodcutting.

Few limitations affect the use of this unit for windbreaks and environmental plantings. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. Examples of suitable plants are Norway spruce, hybrid poplar, Russian-olive, and lilac.

This unit is in capability unit IIIe-1, irrigated, and capability subclass VIe, nonirrigated. It is in MLRA 21.

182—Truax-Searles complex, 2 to 9 percent slopes. This map unit is on low hills and alluvial fans. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,200 to 4,800 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

This unit is about 50 percent Truax soil and 40 percent Searles soil. The Truax soil is on alluvial fans, and the Searles soil is on hills.

Included in this unit are small areas of Dehill fine sandy loam and Rock outcrop. Also included are small areas of soils that are similar to the Truax soil but are 20 to 40 inches deep over bedrock and soils that are similar to the Searles soil but are more than 40 inches deep over bedrock. Included areas make up about 10 percent of the total acreage.

The Truax soil is very deep and well drained. It formed in mixed alluvium derived from extrusive igneous rock. Typically, about 2 percent of the surface is covered with cobbles and stones. The surface layer is brown fine sandy loam about 8 inches thick. The subsoil is brown sandy clay loam about 21 inches thick. The upper 7 inches of the substratum is yellowish brown sandy loam. The lower part to a depth of 60 inches or more is yellowish brown and brown, weakly cemented sandy loam.

Permeability is moderately slow in the Truax soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

The Searles soil is moderately deep and well drained. It formed in material weathered from extrusive igneous rock. Typically, about 25 percent of the surface is covered with stones and cobbles. The surface layer is dark grayish brown very stony loam about 10 inches thick. The upper 6 inches of the subsoil is dark grayish brown very cobbly loam. The lower 12 inches is brown very cobbly clay loam and very cobbly loam. Hard bedrock is at a depth of about 28 inches.

Permeability is moderately slow in the Searles soil. Available water capacity is very low or low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland. The main concern affecting range management on the Searles soil is the stones on and below the surface. Soil properties seldom limit range management on the Truax soil. The stones on the surface limit access by most equipment, including seeding equipment. Limited access for seeding can be partially overcome by broadcast seeding methods. The species that can withstand droughtiness should be selected for seeding. The production of forage on the Searles soil is limited by the stoniness. The high content of gravel, stones, and cobbles in this soil reduces the amount of moisture available for plant growth. Building fences is difficult on this stony soil. As a result, special design is needed.

Western juniper readily invades areas of this unit. It competes for moisture and nutrients and in effect helps to make the environment for desirable species more arid. In areas where the extent of juniper has increased, the potential for forage production is reduced even if proper grazing management is applied. Brush control improves areas where the range has deteriorated and produces more woody vegetation than was evident in the potential plant community. The potential plant community is mainly basin wildrye, bluebunch wheatgrass, Idaho fescue, and mountain big sagebrush on the Truax soil and bluebunch wheatgrass, Antelope bitterbrush, and mountain big sagebrush on the Searles soil.

Where this unit has been invaded by western juniper, the site index is 28 on the Truax soil and 22 on the Searles soil, on the basis of a 50-year site index. The Truax soil can produce 664 cubic feet of wood per acre in a stand of trees that average 53 square feet in the basal area and 12.4 inches in diameter at breast height. The Searles soil can produce 919 cubic feet of wood per acre in a stand of trees that average 80 square feet in the basal area and 11.3 inches in diameter at breast height. The stoniness limits the accessibility for woodcutting and other activities involving the use of equipment. A slippery surface limits the use of equipment to dry periods. Management practices that overcome these limitations generally are not feasible.

The Truax soil is in capability subclass VIe, nonirrigated, and the Searles soil is in capability subclass VIs, nonirrigated. Both soils are in MLRA 21.

183—Tulana silt loam, 0 to 1 percent slopes. This very deep, artificially drained soil is in lake basins. It is protected from flooding by dikes and levees. The water table is controlled by pumping from deep lateral drains. The soil formed in poorly drained, stratified lacustrine sediment derived dominantly from diatomite and volcanic ash. The native vegetation is mainly cattails and bulrushes. Elevation is 4,084 to 4,100 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is about 80 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown and dark gray silt loam about 12 inches thick. The upper 4 inches of the underlying material is light gray silt loam. The next 25 inches is grayish brown and very pale brown silt. The lower part to a depth of 60 inches or more is light yellowish brown, stratified fine sand, loamy sand, silt, and silt loam.

Included in this unit are small areas of Lamath silt loam and Capjac silt loam. Included areas make up about 10 percent of the total acreage.

Permeability is moderately slow in the Tulana soil. Available water capacity is very high because of the influence of diatomite and volcanic ash. The effective rooting depth is 60 inches. The water table is maintained at a depth of 2 to 5 feet throughout the year. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate when the surface layer dries and the wind velocity is high.

This unit is used for wildlife habitat and cultivated crops.

This unit is frequented by migratory waterfowl. It provides food and cover for such wildlife species as ducks, geese, ring-necked pheasants, and birds of prey. Developing shallow water areas can improve the habitat for waterfowl.

If this unit is used for irrigated barley, oats, or potatoes, the main management concerns are the hazard of soil blowing, the seasonal high water table, and the likelihood that frost will occur during any month of the growing season. Soil blowing can be controlled by returning crop residue to the soil and applying a system of conservation tillage. The unusually high available water capacity of the soil can delay or inhibit farming in spring. Deep drains are needed to lower the water table below the root zone of the crops. Because drainage outlets are not available, pumps are needed.

Border and sprinkler irrigation methods are suitable on this unit. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. Many areas are subirrigated by the water table. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Because of the very high available water capacity, the frequency of irrigation can be reduced. The accumulation of water at the end of borders can be minimized by proper irrigation management.

This unit is in capability unit IIIw-2, irrigated, and in MLRA 21.

184—Tulana Variant mucky peat, 0 to 1 percent slopes. This very deep, very poorly drained soil is in lake basins. It formed in organic material underlain by lacustrine sediment derived from diatomite and volcanic ash. The native vegetation is mainly sedges, rushes, forbs, and perennial grasses. Elevation is 4,080 to 4,100 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

Typically, the surface layer is dark gray, grayish brown, and black mucky peat about 22 inches thick. The upper 16 inches of the underlying material is gray silt. The lower part to a depth of 60 inches or more is white silt that has prominent, dark reddish brown and olive gray mottles.

Included in this unit are small areas of Capjac silt loam and Lamath silt loam. Included areas make up about 10 percent of the total acreage.

Permeability is rapid to a depth of 22 inches in the Tulana Variant soil and moderate below that depth. Available water capacity is very high because of the influence of diatomite and volcanic ash. The effective rooting depth is limited by the water table, which is within a depth of 1.5 feet throughout the year. Initial subsidence is 6 to 12 inches, and total subsidence is 20 to 30 inches. Runoff is very slow, and there is no hazard of water erosion. This soil is subject to rare flooding unless it is protected by dikes and levees.

This unit is used for wildlife habitat. It is frequented by migratory waterfowl. It provides food and cover for such wildlife species as ducks, geese, ring-necked pheasants, and birds of prey. Developing shallow water areas can improve the habitat for waterfowl.

This unit is in capability subclass Vw, nonirrigated, and in MLRA 21.

185—Tulebasin mucky silty clay loam, 0 to 1 percent slopes. This very deep, artificially drained soil is in lake basins. It is protected from flooding by dikes and levees. The water table is controlled by pumping from deep lateral drains. The soil formed in very poorly drained lacustrine sediment derived from diatomite and

volcanic ash. The vegetation in areas that are not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 4,030 to 4,050 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is gray mucky silty clay loam about 14 inches thick. The upper 18 inches of the underlying material is grayish brown and light brownish gray, slightly saline silty clay that has distinct, yellowish brown mottles. The lower part to a depth of 60 inches or more is light brownish gray, slightly saline or moderately saline silty clay loam that has distinct, yellowish brown mottles. In some areas the surface layer is loam or silt loam.

Included in this unit are small areas of Capjac silt loam, Laki fine sandy loam, Poe loamy fine sand, and Tulana silt loam. Included areas make up about 15 percent of the total acreage.

Permeability is moderate in the Tulebasin soil. Available water capacity is very high because of the influence of diatomite and volcanic ash. The effective rooting depth is 60 inches or more. The water table is generally maintained at a depth of 1.5 to more than 3.0 feet throughout the year. Runoff is very slow, and the hazard of water erosion is moderate. The hazard of soil blowing is slight. This soil is subject to rare flooding from January through April, but most areas are protected by deep drainage ditches and pumps.

This unit is used for cultivated crops, hay and pasture, and homesite development.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the hazard of soil blowing, the hazard of flooding, the seasonal high water table, and the likelihood that frost will occur during any month of the growing season. Soil blowing can be controlled by returning crop residue to the soil and applying a system of conservation tillage. Floodwater and the seasonal high water table can damage crops by submerging them. The unusually high available water capacity of the soil can delay or inhibit farming in spring. The permeability of the soil is restricted if the large pores in the subsoil are destroyed by subsoiling or other disturbances. Although all areas are protected from flooding by dikes, the dikes can fail because they are constructed with material having low strength. Deep drains are needed to lower the water table below the root zone of the crops. Because drainage outlets are not available, pumps are needed.

Border and sprinkler irrigation systems are suitable on this unit. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage. Many areas are subirrigated by the water table, but this method of irrigation can increase the amount of sodium and salts in the soil. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Because of the very high available water capacity, the frequency of irrigation can be reduced. The accumulation of water at the end of borders can be minimized by proper irrigation management.

If this unit is used for irrigated hay and pasture, the main management concern is the seasonal high water table. The wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Proper grazing practices, weed control, and applications of fertilizer help to ensure the maximum quality of forage. Irrigation water can be applied by the border and sprinkler methods. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the plants but also to the available water capacity and rate of water intake in the soil. Because of the very high available water capacity, the frequency of irrigation can be reduced.

If this unit is used for homesite development, the main management concerns are the seasonal high water table and a low load-supporting capacity. The wetness can be reduced by installing drainage tile around footings. Properly designing buildings and roads can offset the limited ability of the soil to support a load. The plants that can withstand both a seasonal high water table and droughtiness should be selected unless a drainage system and an irrigation system are provided.

The unit is in capability units IIIw-2, irrigated, and IVw-2, nonirrigated. It is in MLRA 21.

186—Zanbur sandy loam, 0 to 2 percent slopes. This very deep, moderately well drained soil is on terraces in basins. It formed in alluvium derived from tuff and volcanic ash and is underlain by lacustrine sediment. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 4,035 to 4,045 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 70 days. Frost can occur during any month of the year.

Typically, the surface layer is grayish brown sandy loam about 10 inches thick. The upper 10 inches of the substratum is light brownish gray and light gray loamy fine sand and loamy sand, and the lower part to a depth of 60 inches or more is white, slightly saline silt loam.

Included in this unit are small areas of Poe loamy

fine sand and Zuman loamy fine sand. Also included are small areas of Laki fine sandy loam. Included areas make up about 15 percent of the total acreage.

Permeability is moderate in the Zanbur soil. Available water capacity is very high because of the influence of diatomite and volcanic ash. The effective rooting depth is 60 inches or more where the soil is artificially drained. The water table is maintained at a depth of 3.5 to 5.0 feet from March through September. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for cultivated crops and for hay and pasture.

If this unit is used for irrigated wheat, barley, oats, or potatoes, the main management concerns are the hazard of soil blowing, a low available water capacity in the surface layer, and the likelihood that frost will occur during any month of the growing season. When the wind velocity is high in spring, soil blowing can be controlled by returning all crop residue to the soil and applying a system of conservation tillage. Because the rate of water intake is rapid in the surface layer, sprinkler irrigation is the best method of applying water. To avoid overirrigation and the leaching of plant nutrients, applications of water should be adjusted not only to the needs of the crop but also to the available water capacity and rate of water intake in the soil. Solid-set sprinkler irrigation is needed in areas used for crops that are susceptible to frost damage.

If this unit is used for irrigated hay and pasture, the main management concerns are the seasonal high water table and the sodicity in the substratum. A high water table that persists in spring could have a detrimental effect on deep-rooted crops. Deep drains are needed to lower the water table below the root zone of the crops. Because drainage outlets are not available, pumps are needed. Irrigation water should be applied carefully. Otherwise, the water table can be raised. The sodicity limits the growth of deep-rooted crops. The content of toxic salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil.

If this unit is used for windbreaks and environmental plantings, the main management concern is the concentration of toxic salts. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. The trees and shrubs selected for planting should be those that can withstand toxicity. Examples are Scotch pine, Siberian elm, Russian-olive, and multiflora rose.

This unit is in capability unit IIIw-1, irrigated, and in MLRA 21.

187—Zuman loamy fine sand, 0 to 1 percent slopes. This very deep, artificially drained soil is in lake basins. In most areas it is protected from flooding by dikes and levees. The water table is controlled by pumping from deep lateral drains. The soil formed in poorly drained lacustrine deposits and alluvium derived from diatomite and extrusive igneous rock. The native vegetation is mainly salt-tolerant grasses, forbs, and shrubs. Elevation is 4,050 to 4,100 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 65 days. Frost can occur during any month of the year.

Typically, the surface layer is gray, slightly saline, slightly sodic loamy fine sand about 4 inches thick. The upper 10 inches of the underlying material is light gray, moderately saline, moderately sodic sandy clay loam. The lower part to a depth of 60 inches or more is light gray, very slightly saline, sodic fine sand.

Included in this unit are small areas of Laki fine sandy loam and Poe loamy fine sand. Included areas make up about 10 percent of the total acreage.

Permeability is moderately slow to a depth of 14 inches in the Zuman soil and rapid below that depth. Available water capacity is low or moderate. The effective rooting depth is 60 inches or more, but it is affected by the seasonal high water table, which is maintained within a depth of 4 feet from March through September. Runoff is very slow, and there is no hazard of water erosion. The hazard of soil blowing is severe. This soil is subject to rare flooding in areas where it is protected by dikes and levees.

This unit is used as pasture. The main management concerns are the wetness and the content of toxic salts. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. The concentration of salts and sodium in the surface layer limits the production of plants suitable for hay and pasture. Leaching the salts from the surface layer is difficult because of the seasonal high water table. A drainage system and good management of irrigation water reduce the content of salts. Salt-tolerant species should be selected for planting.

If this unit is used for windbreaks and environmental plantings, the main limitations are the concentration of toxic salts and the seasonal water table. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. The trees and shrubs selected for planting should be those that can withstand toxicity. Examples are Scotch pine, Siberian elm, Russian-olive, and multiflora rose.

This unit is in capability subclass IIIw, irrigated, and in MLRA 21.

188—Zuman silt loam, ponded, 0 to 1 percent slopes. This very deep, poorly drained soil is in lake basins. It formed in lacustrine deposits and alluvium derived from diatomite and extrusive igneous rock. The native vegetation is mainly salt-tolerant grasses, forbs, and shrubs. Elevation is 4,050 to 4,080 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is about 80 days. Frost can occur during any month of the year.

Typically, the surface layer is gray, slightly saline, sodic silt loam about 4 inches thick. The upper 10 inches of the underlying material is gray, moderately saline, sodic sandy clay loam. The lower part to a depth of 60 inches or more is gray and dark gray, very slightly saline, sodic fine sand. In some areas the surface layer is sandy loam.

Included in this unit are small areas of Capjac silt loam, Forbar fine sand, and Lalos very fine sandy loam. Included areas make up about 10 percent of the total acreage.

Permeability is moderate to a depth of 14 inches in the Zuman soil and rapid below that depth. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is very slow or ponded, and there is no hazard of water erosion. The water table fluctuates between 0.5 foot above and 0.5 foot below the surface from December through April.

This unit is used for wildlife habitat. It provides habitat for such wildlife species as ducks, geese, ring-necked pheasants, and birds of prey. Developing shallow water areas can improve the habitat for waterfowl.

If this unit is used for windbreaks and environmental plantings, the main limitations are the concentration of toxic salts and the seasonal water table. Irrigation is needed when seedlings are planted and during dry periods. Weed control and the selection of suitable plants help to ensure the establishment and survival of seedlings. The trees and shrubs selected for planting should be those that can withstand toxicity. Examples are Scotch pine, Siberian elm, Russian-olive, and multiflora rose.

This unit is in capability subclass VIw, nonirrigated, and in MLRA 21.

Prime Farmland

In this section, prime farmland is defined and the soils in the survey area that are considered prime farmland are listed.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, seed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. An adequate moisture supply and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They either are used for food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils commonly receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and length of growing season are favorable, and the level of acidity or alkalinity is acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 5 percent.

Soils that have a high water table or are droughty may qualify as prime farmland soils where these limitations are overcome by drainage systems or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information about the criteria for prime farmland can be obtained at the local office of the Soil Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 158,530 acres in the survey area, or more than 36 percent of the total acreage, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available and if a drainage system were installed where needed.

Table 5 lists the map units in the survey area that meet the requirements for prime farmland where irrigated or where irrigated and drained. The location of each map unit listed in table 5 is shown on the detailed soil maps at the back of this survey. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

By Nick Pappas, agronomist, and Bob Bartholomew, soil conservationist, Soil Conservation Service.

General management needed for crops and for hay and pasture is suggested in this section. The system of land capability classification used by the Soil Conservation Service is explained, and the estimated yields of the main crops and hay and pasture plants commonly grown are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information about soils and technical assistance in applying the management practices needed on a particular farm can be obtained from the local office of the Soil Conservation Service or the University of California Cooperative Extension Service.

The main management needs on the cropland and pasture in the survey area are measures that help to control erosion, maintain tilth, promote the efficient use of irrigation water, and reduce the content of salts that build up in the soils. These measures include chiseling and subsoiling, a conservation cropping system, conservation tillage, crop residue management, removal of excess water, reduction of the content of toxic salts, erosion control, control of soil blowing, irrigation water management, pasture management, and hayland management. The measures to be used depend on the objectives of land use, the characteristics of the soils, the crops that are to be grown, and the required capital investments. Proper land use planning is essential in obtaining profitable returns and preventing degradation of the soils.

Chiseling and subsoiling can increase the effective rooting depth in soils that have a hardpan. Chiseling or subsoiling shatters the hardpan and thus improves permeability and internal drainage and helps to prevent the development of a perched water table. The soils that can permanently benefit from chiseling or subsoiling are those that have a hardpan near the surface. In these soils a shank can penetrate the pan and break it up. The soils in the survey area that could benefit from chiseling and subsoiling are those of the Modoc, Poman, and Poe series.

Some benefits can be derived from chiseling or subsoiling clayey soils. The benefits are only temporary because the clay eventually reconsolidates. The soils that could temporarily benefit from chiseling or subsoiling are those of the Pit series. Chiseling also is

temporarily beneficial on soils that are compacted as a result of cropping or tillage. Most soils develop compacted layers as a result of tillage. Cultivation should be avoided when the soils are excessively wet. If the soil moisture content is near field capacity, the soil is too wet for cultivation. Working the soil at the correct moisture content helps to prevent the formation of clods. Maintaining a clod-free field is very important, especially in areas where potatoes are grown. Compaction can occur because of the way some crops are cultivated. It may be advantageous to chisel the fields in which these crops are grown before the next crop is planted.

A *conservation cropping system* is an approach to cropping that can help to maintain the suitability of soils for crop production. Where this system is applied, management of tillage practices, fertilizer programs, pest control programs, and crop rotations results in optimal crop production and minimal soil degradation. Economic benefits can be realized, and farming expenses and machinery costs can be lowered.

Intensive tillage reduces the organic matter content and rate of water infiltration in the soil, destroys soil structure, results in poor tilth and the loss of plant nutrients, and increases the susceptibility of the soil to erosion. Crop performance can be seriously affected. A good cropping system includes cultural practices and crop rotations that offset the deteriorating effects of cropping year after year. The crops to be included in the rotation should be carefully selected. Some crops and the practices required to grow them result in soil degradation. Other crops are soil enhancing. Potatoes, which require much tillage and are heavy consumers of plant nutrients, are examples of soil-depleting crops. Legumes, such as alfalfa, are soil-enhancing plants because they result in the fixation of nitrogen, require limited tillage, and have permanent root systems. If properly managed, hay and pasture crops improve soil structure and increase the organic matter content. Properly planned crop rotations can offset soil degradation.

A good cropping system minimizes erosion. It results in a protective cover of plants or crop residue during periods when the wind blows or when water erosion is likely to occur. Returning crop residue or green manure to the soil helps to maintain the organic matter content. Soil structure, available water capacity, and the supply of nutrients are all affected by the organic matter content of the soil.

A planned cropping system helps to control weeds and pests and maximizes the benefits derived from applications of fertilizer and other chemicals. Nematodes are a problem on most of the cropped soils in the survey area. They can be controlled by appropriate crop rotations and cultural practices.

Conservation tillage keeps to a minimum the number of tillage operations needed to control weeds, to incorporate crop residue into the soil, to break up the soil and thus improve the movement of air and water, and to prepare an adequate seedbed. It can range from no-till farming to something less than conventional tillage. Where a system of conservation tillage is applied, at least 30 percent of the surface is covered by crop residue after planting.

In contrast to conventional tillage, conservation tillage protects the soil from water erosion and soil blowing, but it requires more intensive management. It can reduce production costs. It is most beneficial on coarse textured soils that are susceptible to soil blowing, such as those of the Fordney, Leavers, Rojo, and Dehill series. Some of the major considerations in applying a system of conservation tillage are the handling of crop residue by tillage and planting machines, slower warming of cold and wet soils in spring, the placement of fertilizer, the effectiveness of pesticides, and the response of crops.

A systems approach should be an integral part of a good conservation tillage program. Because of the large amount of surface residue that is required for the success of conservation tillage, management of crop residue is essential. The nature of the soils and the climatic conditions in the survey area can affect conservation tillage. Because of a shorter growing season and colder temperatures, leaving crop residue on the surface can slow the warming of the soils in spring and the seasonal breakdown of the residue. These effects are more pronounced on the wetter and finer textured soils than on other soils.

Crop residue management is very important no matter what type of tillage system is used. It helps to maintain tilth, the organic matter content, and soil structure and reduces the hazards of soil blowing and water erosion. Including high-residue crops, such as small grain, in the cropping system helps to compensate for the adverse effects of growing low-residue crops, such as potatoes. Crop residue management is beneficial on all of the soils in the survey area, especially Fordney, Poman, Poe, and Rojo soils, which are subject to soil blowing.

Removal of excess water is needed in areas where surface and subsurface water accumulates as a result of rainfall, runoff, or irrigation. It is especially needed in areas of deep-rooted crops. It increases the yields of other crops. The soils that can benefit from this practice are those of the Capjac, Tulana, Tulebasin, and Lamath series. In areas of Leavers, Munnel, and Fordney soils, a high water table early in the growing season is an important consideration if deep-rooted crops are grown.

A subsurface drainage system commonly is required

to keep water below the root zone of the crops and to remove leached salts from the soils. Subsurface drainage can be improved by open ditches and tile drains or other perforated pipe systems. When installation of a subsurface drainage system is considered, management of the collected effluent should be a prime consideration because of the need to maintain the quality of the water and the effectiveness of the system.

Treatment may be needed in swales and other low areas where excess surface water tends to collect. The accumulation of surface water can be prevented by shaping and grading the land, leveling soils that are to be irrigated, and using a tailwater recovery system. Excess surface water is associated mainly with the finer textured soils in which the rate of water infiltration is slow. Examples are Medford and Pit soils. Low areas require diversions, dikes, or canals to divert and control floodwater and other surface water.

Reduction of the content of toxic salts can significantly improve the growth of some crops. In some of the soils in the survey area, toxic salts result in sodicity or salinity, or a combination of both. A high content of sodium causes soil particles to disperse and thus reduces the rate of water infiltration. The content of sodium can be high enough to be toxic to plants. Most of the problems involving sodium, however, are associated with poor infiltration of water.

Salinity problems arise because an excessive amount of soluble salts in the soils reduces the amount of water that is available to crops. When the content of salts is high, the concentration can be toxic to plants. The salinity can be reduced by applying water in amounts sufficient to leach the salts out of the root zone. Reclamation of sodic soils requires the application of amendments to replace the sodium so that it can be leached from the soils. In some areas mechanical treatment is needed to facilitate the mixing of the amendments before the salts and sodium are leached.

Problems arise when there is a high water table or when the water bearing the leached salts cannot be removed from the soils. Inlow and Ocho soils are affected by sodicity, and the Zuman, Laki, and Henley soils are affected by salinity.

Erosion control is needed on most of the soils in the survey area. The soils that have slopes of more than 2 percent are especially susceptible to water erosion. Unique problems associated with erosion apply to the soils in this survey area. The cold climatic conditions limit the plant cover during critical periods. As a result the hazard of erosion is increased. Water erosion occurs when the soils are not protected by a plant cover and rain strikes the bare surface. If rainfall or snowmelt occurs when the soils are frozen, the water runs off the surface and causes severe erosion. The soils on which water erosion can be a problem are those of the Rojo, Eastable, and Hedox series.

Control of soil blowing is particularly needed on coarse textured to medium textured soils that are dry and are not protected by crop residue or a plant cover. Examples are Fordney, Poman, Rojo, and Leavers soils. The climate and farming requirements are such that these soils generally are farmed when they are bare and dry during periods of strong winds. Effective control of soil blowing requires careful planning and modification of cropping and cultural practices. The surface should be protected either by crop residue or a cover crop. Early fall seeding of cereal grains and ridge tillage can reduce the hazard of soil blowing. Permanent windbreaks are a sound long-term investment. They reduce the hazard of soil blowing and help to prevent the crop damage caused by windblown soil particles. Windbreaks can consist of trees, perennial grasses, or shrubs.

Irrigation water management is essential on all irrigated soils. Careful planning of field irrigation grades, water delivery systems, and irrigation water management is important for profitable crop production and for the conservation of soil and water.

The irrigation methods that can be used in this survey area include furrow, border, and sprinkler systems. Where a surface (furrow or border) system is used, the fields should be graded in such a way that the irrigation water is used most efficiently. Slopes should be limited to less than 2 percent. The properties of the soils should be carefully considered before the fields are graded. The depth of the soils to a pan or to another restrictive layer should be investigated so that the prepared field can adequately meet the needs of the crops for nutrients and water. The length of irrigation runs should be based on the infiltration characteristics of the soils. Sprinkler irrigation systems are best suited to the soils that have a very high water infiltration rate or that have slopes of more than 2 percent.

Effective management of irrigation water depends on the availability of good information about the soils. It is achieved by controlling the amount of water applied and the time of application so that maximum production is achieved without degrading the soils. Good management of irrigation water reduces production costs, conserves water, and protects the quality of the water.

Pasture management is needed to protect the soil and to obtain optimal sustained yields. Maintaining stands of desirable plants is a major consideration.

Desirable plants commonly are those that are most palatable. Weedy or undesirable plants generally thrive because they are not preferred by livestock. The desirable plants should be grazed to a level that permits them to continue to grow vigorously. This response is feasible only if enough leaf surface is left to permit the plants to regrow. When plants are grazed to the crowns, their growth rate is greatly reduced. A good rotation grazing plan is one that leaves enough plant growth following periods of grazing to permit recovery of the plants. Irrigation and applications of fertilizer can help to ensure maximum production. When a pasture is managed for maximum plant growth, the soil moisture content should be kept near field capacity in order to ensure the best yields. Surface compaction can be minimized by keeping animals off the pasture during wet periods. Harrowing or dragging can scatter animal manure and thus improve the pasture.

Hayland management should result in sustained production and in protection of the soil. Sustained production can be achieved by keeping the field clear of weed infestations and harvesting the forage at intervals that allow the plants to sustain vigorous growth. Good management of irrigation water is essential. Overirrigation can reduce the level of oxygen in the soil, especially in areas where alfalfa is grown. The plants cannot tolerate long periods of water saturation. They die or are attacked by diseases and thus loose vigor. Grasses can take advantage of this condition and infest the field.

Yields per Acre

The average yields per acre that can be expected of the principal irrigated crops grown under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the University of California Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops *(13)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils generally are grouped at three levels—capability class, subclass, and unit. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that

reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

There are no class I or II soils in this survey area.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units generally are designated by adding an Arabic numeral to the subclass symbol, for example, IIIe-8 and IVe-1. The numbers used to designate units within the subclasses are as follows:

0. Indicates limitations caused by stony, cobbly, or gravelly material in the substratum.

1. Indicates limitations caused by slope or by an actual or potential erosion hazard.

2. Indicates a limitation of wetness caused by poor drainage or flooding.

3. Indicates a limitation of slow or very slow permeability in a clayey subsoil or a semiconsolidated substratum.

4. Indicates a low available water capacity in sandy or gravelly soils.

5. Indicates limitations caused by a fine textured or very fine textured surface layer.

6. Indicates limitations caused by salts or alkali.

7. Indicates limitations caused by rocks, stones, or cobblestones.

8. Indicates that the root zone generally has an insufficient supply of moisture because it is less than 40 inches deep over massive bedrock.

9. Indicates that a limitation is caused by low or very low fertility, acidity, or toxicity. This limitation cannot be overcome by adding normal amounts of fertilizer, lime, or other amendments.

10. Indicates that a problem or limitation, such as subsidence or susceptibility to burning or soil blowing, is caused by a high content of organic matter.

The irrigated and nonirrigated capability classification of each map unit is shown in table 7 and in the section "Detailed Soil Map Units."

Land Resource Areas

The land capability classification system is further refined by designating the major land resource area (MLRA) in which the soils in a unit occur. An MLRA is a broad geographic area that has a distinct combination of climate, soils, management needs, and cropping systems. The 48 coterminous states in the Nation have been divided into 16 major land resource areas. Parts of two of these nationally designated areas occur in this survey area. These areas are designated MLRA 21 and MLRA 22. Land resource area 21 includes Tule Lake Basin, Butte Valley, Lower Klamath Lake, and the adjacent uplands, and area 22 is the Sierra Nevada Range.

MLRA 21.—This resource area makes up about 92 percent of the survey area. It is on valley floors, terraces, and alluvial fans and on the adjacent uplands. The soils in this area are nearly level to very steep. Elevation ranges from 4,030 to 6,518 feet. The average annual rainfall ranges from 11 to 16 inches. This area is used for rangeland, cultivated crops, irrigated hay and pasture, and wildlife habitat.

MLRA 22.—This resource area makes up about 8 percent of the survey area. It is on mountains and in high mountain valleys. The soils in this area are moderately sloping to steep. Elevation ranges from 4,400 to 6,500 feet. The average annual rainfall ranges from 25 to 35 inches. The area is used as woodland.

The MLRA for each map unit in this survey area is given in the section "Detailed Soil Map Units."

Storie Index Rating

By Gordon L. Huntington, lecturer and soil scientist, Department of Land, Air, and Water Resources, University of California, Davis.

The soils in the survey area are rated in table 8 according to the Storie index *(9).* This index expresses numerically the relative degree of suitability of a soil for generally intensive agricultural uses at the time of evaluation. The rating is based on soil characteristics only and is obtained by evaluating such factors as soil

depth, texture of the surface layer, subsoil characteristics, and surface relief. Availability of water for irrigation, local climate, size and accessibility of mapped areas, distance to markets, and other factors that might determine the desirability of growing certain plants in a given locality are not considered. Therefore, the index should not be used as the only indicator of land value. Where the local economic and geographic factors are known to the user, however, the Storie index provides additional objective information for land tract value comparisons.

Four general factors are used in determining the index rating—*A*, the permeability, water retention characteristics, and depth of the soil; *B*, the texture of the surface soil; *C*, the dominant slope of the soil body; and *X*, other soil conditions more readily subject to management or modification by the land user. In this survey area these conditions include drainage, flooding, salinity, sodicity, fertility, and microrelief. For some soils more than one of these conditions are used in determining the rating. A rating of 100 percent expresses the most favorable, or ideal, condition for the production of locally adapted crops. Lower percentage ratings are assigned for conditions that are less favorable. Factor ratings, in percent, are selected from tables prepared from data and observations that relate soil properties to plant growth and crop yields *(8)*. In the tables currently used *(9)*, certain properties are assigned a range of values to allow for variations in the properties that affect the suitability of the soil for general agricultural purposes. Examples of these properties are soil depth and the content of gravel in a surface layer of gravelly loam. When there is a range of values, the modal condition of a soil property, as it is described in a detailed soil map unit, is used to select a value for a factor.

The index rating for a soil is obtained by multiplying the values given to its four general factors, A, B, C, and X. If more than one condition is recognized for the X factor for a soil, the value for each condition acts as an additional multiplier. Thus, any of the general factors or factor conditions may dominate or control the final rating. For example, consider a soil such as Leavers sandy loam, 0 to 2 percent slopes. This is a very deep soil that formed in stratified alluvium. It is moderately rapidly permeable and has a low available water capacity to a depth of 60 inches because of a very gravelly substratum. These characteristics warrant a rating of 80 percent for factor A. The rating for factor B is 95 because the surface layer of sandy loam has a moderate available water capacity, can be easily worked during seedbed preparation, and has a favorable rate of water intake. The rating for factor C is 100 because the soil is nearly level. The soil has a seasonal high water table and only fair fertility. These characteristics warrant a combined value of 72 for the X factor. Multiplying A, B, C, and X gives a Storie index of 55 for this soil. If the seasonal high water table is lowered, the Storie index can be increased by assigning appropriate higher values to the X factor to reflect the changed condition. For example, the Storie index rating for Leavers sandy loam, drained, 0 to 5 percent slopes, is 64.

Ratings of the soil complexes in the survey area, such as the Hedox-Porterfield complex, 5 to 15 percent slopes, reflect the proportions of the dominant soils described in the map units. Each of the dominant soils in such units is rated separately in table 8. The Storie index rating for each unit is a proportionally weighted average of the separate ratings. Miscellaneous areas, such as Rubble land, are not evaluated in terms of factors A, B, C, or X. They have characteristics or features that preclude common agricultural uses; therefore, they are assigned an index rating of zero.

Soils are assigned in grades according to their suitability for general intensive agriculture as shown by their Storie index ratings. The six grades and their range in index ratings are:

Grade 1	80 to 100
Grade 2	60 to 79
Grade 3	40 to 59
Grade 4	20 to 39
Grade 5	10 to 19
Grade 6	less than 10

In this survey area the soils in *grade 1* are well suited to the intensively grown irrigated crops that are climatically adapted to the region. *Grade 2* soils are good agricultural soils, although they are not so desirable as soils in grade 1 because of somewhat steeper slopes, lower fertility, or somewhat restricted permeability at a depth of more than 3 feet. *Grade 3* soils are only fairly well suited to general agriculture because of restricted drainage, slope, mild saline-sodic conditions, a coarse textured surface layer, a very gravelly substratum, or a combination of these. *Grade 4* soils are poorly suited. They are severely limited in their agricultural potential because of poor drainage, a stony surface layer, a low available water capacity, steep slopes, shallowness, strong saline-sodic conditions, or a combination of these. *Grade 5* soils are very poorly suited to agriculture and are seldom cultivated. They are more commonly used for rangeland or the production of western juniper. *Grade 6* soils and miscellaneous areas are not suitable for agriculture because of very severe or extreme limitations. They are better suited to limited use as rangeland, woodland, or wildlife habitat. Table 8 lists the grade for each map unit in the survey area.

Rangeland

By Richard King, range conservationist, Soil Conservation Service.

About 39 percent of the acreage in the survey area is rangeland. Cow-calf-stocker operations are the most common livestock enterprises. Ranches range from 500 acres to 3,000 acres in size. The average ranching unit is about 1,000 acres.

The privately owned rangeland is primarily in the Butte Valley and Tule Lake Valley areas. Adjacent plateau and mountain areas are mostly federal lands administered by the Forest Service and the Bureau of Land Management. The interdependence of private and public grazing lands significantly affects most livestock enterprises. Many of the operating units have permits for grazing on the federal lands in spring, summer, or fall.

Cattle either are transported out of the survey area by early winter for grazing in milder climates or are kept on private lands and fed hay during the harsh winters. Calving normally begins in February and is completed by May. Calves are weaned in fall and are either sold immediately or kept until the following year, when they are sold as stockers or shipped to feedlots, depending on their size.

The history of range use in the survey area is very similar to the history of all rangeland in the West. Overgrazing greatly changed the character of the native vegetation by the turn of the century. Despite the serious degradation of soil, plant, wildlife, and water resources that has occurred since pioneer days, the rangeland in the survey area has been substantially improved in recent decades. It generally is considered to be in better ecological condition than at any time during the past 100 years.

Even with the general and gradual improvement of the range condition in recent decades, the rangeland still is seriously degraded in some areas. Most of the rangeland produces far below its potential for water, livestock, wildlife, recreation, and wood products.

The effective management of rangeland depends on the wise use of all available resources. This soil survey can help range managers to better understand the capabilities of their soil and vegetation resources. Such information is important in setting goals and defining objectives for land and livestock management.

An important objective in range management is to control livestock so that overgrazing is minimized and the impact of livestock is beneficial. Controlling the frequency and intensity of grazing allows individual plants to maintain an adequate leaf area and thus maximizes forage production. Grazing too frequently or too intensively reduces the efficiency with which plants are able to capture and convert sunlight, via photosynthesis, to forage. Grazing too infrequently or too lightly does not allow livestock to efficiently harvest the forage. The unharvested forage may eventually reduce productivity by keeping sunlight from reaching new growth. Proper grazing ensures that the forage is harvested efficiently by livestock and that an adequate area remains ungrazed in order to permit regrowth and to protect the soil from excessive erosion.

Evidence indicates that the extent of woody shrubs has increased dramatically in the past 150 to 200 years. Before that time, fires started by lightning and Indians probably reduced the amount of shrubs, such as juniper and sagebrush. Areas where soil conditions are unfavorable for the growth of herbaceous plants probably burned less frequently or less intensively. Thus, these areas have probably always supported a significant amount of woody vegetation, even though productivity is comparatively low.

In addition to burning young trees and brush, fire probably has increased the extent of perennial grasses and reduced the probability of the survival of woody seedlings in this arid climate. Properly applied grazing systems and prescribed burning enhance the competitive abilities of grasses while reducing those of woody plants.

Brush encroachment, lack of perennial grasses, and erosion are all symptomatic of a deteriorated range condition. Range seeding and measures that control brush and erosion can improve deteriorated range sites. Range managers should be certain that the cause of these symptoms has been rectified before investing additional time and money. On most ranches poor range condition is the result of improper grazing. Increased erosion can be attributed to an insufficient plant cover and the uncontrolled impact of livestock on the site, as is evident in the development of livestock trails. These degradation processes can be addressed through conservation planning and the application of appropriate practices. Conservation planning should include the consideration and organization of all resources, including human resources. The planning process should be guided by clearly defined objectives set by the land owner working with a conservationist. Information in this soil survey can help the manager to establish sound goals and objectives.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationships among the soils, vegetation, water, animals, and microorganisms.

Table 9 shows, for most of the soils in the survey area, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years;

the characteristic vegetation; and the average percentage of each species. Only those soils that are used as rangeland or are suited to use as rangeland are listed. Explanation of the column headings in table 9 follows.

A *range site* is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was ascertained during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Plant productivity in turn affects soil properties through the complex interrelationship of other organisms, fire, and climate.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruit of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre of air-dry vegetation. Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only. It does not have a specific meaning that pertains to the present plant community in a given use.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimal production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Woodland Management and Productivity

By Charles F. Diehl, forester, Soil Conservation Service.

Commercial forest land in this survey area totals 28,720 acres, or nearly 7 percent of the area, and western juniper woodland totals 20,416 acres, or nearly 5 percent of the area. In addition, western juniper has invaded 71,675 acres, or about 16 percent of the area. The commercial forests and other wooded areas are a source of wood products that can be used on farms and ranches. They also provide opportunities for recreation, provide food and cover for many kinds of wildlife, and protect watersheds.

Commercial conifers grow mainly at the upper elevations in the western and southwestern parts of Butte Valley. They include ponderosa pine, Douglas-fir, white fir, incense cedar, Jeffrey pine, and sugar pine. Some areas in these parts of the valley have been cleared and are used for crops or for livestock grazing. Fire has limited reforestation in some areas, which are now covered with brush. In many areas the timber has been harvested three or four times.

Most of the western juniper woodland in the survey area extends from Butte Valley eastward to the survey boundary. The juniper generally grows on shallow, rocky soils and bluffs of volcanic origin *(15)*. The stands of western juniper have increased in extent since the 1870's because they have been protected from natural fires and overgrazing. Varying amounts of grazeable understory vegetation are throughout these stands, depending on the density of the overstory canopy. Western juniper is a strong competitor for soil moisture. Before herbaceous plants begin to use moisture, the juniper uses much of the moisture that accumulates in winter.

The timber harvested from the commercial forests is used for lumber, plywood, wood chips, and shingles. Mills that fabricate these products are throughout Siskiyou County, California, and the southern part of

Oregon. The western juniper is used for firewood and fenceposts, which are important commodities in the local economy.

The main forest cover types in the survey area are the Sierra Nevada mixed conifer type, the Pacific ponderosa pine type, the Pacific ponderosa pine and Douglas-fir type, and the western juniper type *(7)*.

The Sierra Nevada mixed conifer type (SAF type 243) consists mainly of ponderosa pine, sugar pine, white fir, Douglas-fir, or incense cedar, either singly or in combination. Significant amounts of white fir are in the stands when ponderosa pine or Douglas-fir is the dominant species.

The Pacific ponderosa pine type (SAF type 245) consists of ponderosa pine occurring in pure stands (80 percent or more). White fir occurs in insignificant amounts (20 percent or less). Generally, sugar pine is mixed with the ponderosa pine, especially on the better sites, and incense cedar, Douglas-fir, and small amounts of white fir are in some of the higher areas.

The Pacific ponderosa pine and Douglas-fir type (SAF type 244) is dominated by ponderosa pine and Douglas-fir, although neither species makes up as much as 80 percent of the stands. White fir does not occur in significant amounts. Small amounts of incense cedar, sugar pine, and other conifers as well as a variety of hardwoods commonly are in the stands.

The western juniper type (SAF type 283) extends south from the central and eastern parts of Oregon into California and Nevada. Western juniper most commonly occurs in association with big sagebrush, bluebunch wheatgrass, rabbitbrush, and Idaho fescue. Low sagebrush commonly grows on very poor sites. The overall range of elevation in areas of this forest type is 1,600 to 6,500 feet. In this survey area, however, the range is 4,100 to 6,518 feet.

Western juniper naturally grows on rocky bluffs and on generally shallow to moderately deep, stony or very stony loams and sandy loams. Stands of this forest type are not subject to fires because there is not enough vegetation for a significant fire. Young trees are easily killed by ground fires. Older trees are more resistant because of their thicker bark and higher crowns *(14)*.

Western juniper can survive in areas that receive as little as 8 inches of annual precipitation *(3)*. Thus, it is able to grow on sites that are too dry to support commercial forest trees. At the higher elevations the western juniper is mixed with ponderosa pine and Jeffrey pine. The juniper is largely restricted to inhospitable dry environments because it is unable to compete with forest trees on the better sites. It can endure shade when it is young, but it becomes very intolerant of shade as it matures.

Where western juniper has increased in extent, the pure stands are relatively young, having germinated mainly between 1870 and 1910. They grow on essentially all exposures and slopes and in areas of nearly all soil textures. Most of the soils that support western juniper are in the mesic temperature class, but some are in the frigid class *(17)*.

Table 10 can be used by woodland owners and forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The ordination system groups soils according to their potential productivity and the principal soil properties that influence the use and management of the soils as woodland. The ordination system has two levels—class and subclass. The class and subclass symbols are called *ordination symbols (19)*.

The first element in the ordination symbol is the class. It is a number that indicates potential productivity in cubic meters of wood per hectare per year for an indicator tree species (one cubic meter per hectare equals 14.3 cubic feet per acre). Potential productivity is based on the site index. The growth in cubic meters is calculated at the age of culmination of the mean annual increment (CMAI) for fully stocked, natural stands that are unmanaged, although they are protected from fire. The species that determines the ordination class is called the indicator species, which is common in the area and generally is the most productive species on the soil. It is the first species listed for each soil in table 10.

The second element in the ordination symbol is the subclass. It is a capital letter denoting certain hazards or limitations that affect management. The letter *R* indicates a slope of more than 30 percent in areas used for commercial timber and a slope of more than 15 percent in areas used for firewood; *F* indicates a high content of rock fragments in the soil; and *A* indicates that limitations or restrictions are insignificant. If a soil has more than one signigicant limitation, the priority is as follows: R and F. Plant competition and other special considerations are not used to determine the subclass.

The *potential productivity* of merchantable or *commonly grown trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of

growth rate, quality, value, and marketability.

If sufficient data are available, the *site range* is listed in table 10. The site range indicates the lowest and highest values measured. The site indexes for ponderosa pine are based on 100-year age curves developed by Meyer *(11)*; those for Douglas-fir are based on 100-year age curves developed by McArdle and others *(10)*; and those for white fir are based on 50-year age curves developed by Schumacher *(25)*.

Estimates of the potential productivity of each soil, in cubic feet and board feet (Scribner scale) per acre per year at the culmination of the mean annual increment are given in the detailed soil map unit descriptions. It was assumed that stands were fully stocked and unmanaged. On exposed ridges the wind can reduce productivity well below the estimates for the soil. Open areas, such as areas of rock outcrops at high elevations, can also reduce the productivity of map units.

Estimating the potential productivity of the soils that commonly support western juniper is difficult. In table 10, the site indexes for soils that support western juniper are based on 50-year age curves developed by Barrett and Cochran *(20)*. Estimates of the total yield, in cubic feet, of western juniper are based on plot measurements and on volume tables developed by the Pacific Northwest Forest and Range Experiment Station *(21)*.

In table 10, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

The depth of the snowpack limits access and equipment use at elevations above 4,500 feet from December 15 through April 15. Watering, oiling, or other road-surface and dust-control treatments may be desirable if the soils are subject to heavy use during dry periods.

The slope is an important consideration affecting the selection of harvesting equipment or systems. If the slope is less than 30 percent, few limitations affect the use of wheeled and tracked equipment. Where the slope is 30 to 50 percent, more care is needed in choosing the equipment that is best suited to the site. Cable yarding systems generally cause the least surface disturbance where the terrain and road systems are conducive to their use. Where the existing skid trails and haul roads can be used or where short, steep slopes are intermingled with nearly level areas, however, tractor yarding equipment can sometimes be used with minimal surface disturbance. In large areas where the slope is more than 50 percent, cable yarding systems generally cause less surface disturbance than tractor yarding equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that no problem is expected under normal conditions (expected mortality is less than 25 percent); *moderate* indicates that extra precautions are advisable (expected mortality is 25 to 50 percent); and *severe* indicates that precautions are important and that replanting may be necessary (expected mortality is more than 50 percent).

The soil properties that commonly influence seedling mortality include texture, content of rock fragments, temperature, and drainage. An available water capacity of less than 2.5 inches in the upper 24 inches is a severe limitation, especially on south- and west-facing slopes. The species to be planted, the type of planting stock, the availability of shade, the harvesting techniques to be used, and the available water capacity of the soil should be considered when plans for reforestation are made.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; and *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

Plant competition is related to the available water capacity of the soils. Productive soils have a high available water capacity and support many plant species. As a result, plant competition generally is severe. Conifer seedlings commonly regenerate slowly and can be suppressed by other vegetation because of the competition for moisture and light. Careful selection of silvicultural and harvesting systems or intensive site preparation may be needed to ensure adequate reforestation.

Ratings of the *susceptibility of the soil to damage from*

fire are intended to be used as a general guideline when plans are made either for prescribed burning or for revegetation after a wildfire. The risk of damage increases with the intensity of the heat. The damage is related mainly to the loss of organic matter. Some soils have characteristics that enable them to withstand this loss better than other soils. A rating of *slight* indicates that most types of fire will not have an adverse effect on soil characteristics and future productivity; *moderate*, that some extra care is needed in planning to maintain favorable soil characteristics; and *severe*, that special attention is needed to maintain the organic matter content and productivity of the soil.

Ratings of the *susceptibility of the soil to damage from compaction* indicate the tendency of a soil to be adversely affected by the weight of equipment. Soil density is increased when the soil is compacted. The increased density can affect productivity by increasing the resistance to root penetration and reducing the availability of oxygen to plant roots. Also, it can restrict permeability and the rate of water infiltration. The ratings are based on the texture, organic matter content, and content of rock fragments in the upper 10 inches of the soil. A rating of *slight* indicates that considerable effort is required to compact the soil enough to adversely affect plant growth or the water infiltration rate; *moderate*, that less effort is required to cause compaction or that an easily compacted soil recovers rapidly because of the type and content of clay; and *severe*, that the soils are easily compacted and do not readily recover from the adverse affects of compaction.

Compaction is most likely to occur when the soils are wet. The activities that can cause compaction are site preparation, log skidding, livestock grazing, or any other activity that applies weight on a wet soil.

Ratings of the *hazard of sheet and rill erosion after harvest* are given in table 10 for bare areas and for areas yarded by tractor or cable. The rating is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive soil loss. The ratings are based on approximately 180 transects in recently harvested areas in Northern California. The remaining overstory and understory vegetation, slash, root systems, and water bars reduce the erosion hazard below that in bare areas. The hazard of sheet and rill erosion after timber is harvested generally is slight in areas where cable yarding systems are used, but it is moderate in some of these areas. Tractor yarding systems generally increase the hazard of erosion on steep slopes *(18)*.

A rating of the hazard of erosion in bare areas is given in the soil descriptions under the heading "Detailed Soil Map Units." This rating is used as a basis of comparison with all other soils. It is valid only for a soil that is devoid of vegetation, mulch, or other ground cover. This condition is expected to occur rarely. An extremely hot fire, tillage, and attempted conversions to other land uses could result in bare areas. The rating provides a general guide to the erodibility of exposed soil on skid trails and landings. It is based on the slope and the inherent erodibility of the soil.

The rating does not account for gully, ditch, or streambank erosion or for the mass movement caused by geologic conditions, unusual local moisture conditions, ground disturbance, or plant manipulation. The soils that have an obvious tendency to slump or be gullied or that are known to be susceptible to mass movement are identified in the map unit descriptions. Existing slips are shown on the soil maps if they were recognized by the soil scientists.

The measures that can prevent excessive soil loss and the degradation of water quality vary from one area to another. The proper location, design, and installation of roads, culverts, water bars, and stream crossings are critical. In areas that have been cut and filled, seeding or mulching as needed can reduce the hazard of sheet and rill erosion. Buffer strips along streams help to keep sediments from entering the water, control streambank erosion, and can help to maintain a favorable water temperature.

Erosion control and soil characteristics should be considered when site preparation for tree planting is planned. Machinery, chemicals, and fire can adversely affect the soil characteristics and increase the hazard of erosion if they are not properly used or applied. Selection of the proper equipment and a careful, skilled operator are the keys to controlling the erosion related to forest management activities.

Woodland Understory Vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. If well managed, some woodland can produce enough understory vegetation to support grazing by livestock or wildlife, or both, without damage to the trees.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive. Increased production of understory plants can be obtained by selectively thinning and reducing the density of the canopy to a desirable level.

Much of the part of the survey area that supports western juniper is grazed by livestock and wildlife. The understory generally consists of plant communities that are similar to those on the rangeland in the area. Emphasis should be placed on livestock distribution practices, such as fencing, developing watering facilities, and optimally locating salt and minerals for livestock. Stocking rates should be based on the usable forage, which generally decreases in abundance as the density of the canopy increases.

Where wood production is not an objective of the landowner, trees are sometimes thinned or removed in an effort to increase the amount of forage for livestock. Also, desirable forage species are seeded in some of the less sloping areas. Many of the soils in these areas are well suited to woody species and may require followup treatments to eliminate brush. The value of the woody species for wildlife habitat should be considered.

The vegetation along stream channels provides important habitat for fish and wildlife. Retention of this vegetation helps to prevent streambank erosion, gullying, and the sedimentation of streams.

Some areas that support commercial conifers are grazed by livestock or wildlife. These areas provide valuable wildlife habitat until the canopy becomes very dense. The understory vegetation under a full canopy generally consists of sparse annual forbs, scattered perennial grasses, and shrubs. The total amount of usable forage generally is less than 250 pounds per acre under a full canopy. It increases for a few years after the canopy cover is removed by timber harvesting or by fire, but it decreases rapidly as new trees begin to develop a canopy cover.

The plant species that occur in the woodland understory are given in the section "Detailed Soil Map Units."

Windbreaks and Environmental Plantings

By Charles F. Diehl, forester, Soil Conservation Service.

Strong winds in spring and fall are the cause of most of the drifting sand and dust that damage crops and personal property and reduce soil fertility in the survey area. Reduced visibility on roadways is a hazard to motorists during the windy periods. The repair and maintenance of fields, fences, and roads are costly over a long period. Loss of crops, the need to replant crops, and increased demand for fertilizer cause economic hardships for the farmers and ranchers in the area. Planting windbreaks is one way to minimize this damage. The soils that are susceptible to soil blowing are identified in the section "Detailed Soil Map Units." Suitable management is suggested, and the tree species that are suited to the soils are specified.

Windbreaks protect livestock, buildings, and yards from wind, drifting sand, dust, and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. These windbreaks protect cropland and crops from wind and drifting sand, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 11 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 11 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the University of California Cooperative Extension Service or from a nursery.

Recreation

By David W. Patterson, biologist, Soil Conservation Service.

Extensive and unique wildlife populations, scenic landscapes, and cultural and historical resources provide diverse opportunities for recreation in this survey area. Large migratory flights of waterfowl and a diversity of waterfowl and shore birds attract large numbers of bird watchers to the Lower Klamath and Tule Lake National Wildlife Refuges throughout the year. A population of American bald eagles concentrates in unusually large numbers in winter and during the nesting season in spring. Recreational enterprises are important contributors to the local economy.

The marshes of Lower Klamath Lake and Tule Lake Swamp have large populations of pheasants, which are sought after by sportsmen each year. The marshes also provide exceptional opportunities for the hunting of ducks and geese.

Part of the Lava Beds National Monument is in the survey area. This monument provides large numbers of visitors the opportunity to view ancient Indian artifacts and pictographs, to camp, and to view the site where

Indians clashed with the U.S. Army not so long ago.

Except for the state and federal refuges and the Lava Beds National Monument, most of the land in the survey area is privately owned. Some deer and antelope inhabit both public and private lands. Hunting and the study of nature, archaeology, and history are the main forms of recreation in the survey area.

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and access of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when the flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 12, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties generally are favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, or limited use or by a combination of these measures.

The information in table 12 can be supplemented by other information in this soil survey, for example, interpretations for dwellings without basements and for local roads and streets in table 14 and interpretations for septic tank absorption fields in table 15.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils are gently sloping and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

By David W. Patterson, biologist, Soil Conservation Service.

Wildlife and wildlife habitat are an important part of the environment within this survey area. Although agriculture can provide important habitat diversity, the development and management of agricultural enterprises can have a significant detrimental impact on wildlife habitat, especially wetlands. The feasibility of land conversion should be carefully evaluated, especially in areas where the soils are limited by salinity, sodicity, or wetness. Converting areas of natural vegetation or wetlands to farmland may not be justified because of extra development and farming costs.

Fish and wildlife provide opportunities for both recreation and income and add to the quality of life in the survey area. The Butte Valley Wildlife Area at Meiss Lake, operated by the State of California, the federally operated Lower Klamath and Tule Lake National Wildllife Refuges, and privately owned wetlands provide important habitat for waterfowl and many other kinds of wildlife. Hunting for waterfowl, pheasant, antelope, deer, and dove on both public and private lands is an important source of local income. The refuges provide important opportunities for observing large numbers of waterfowl and other wildlife. The wetlands in the survey area are important feeding areas for the endangered American bald eagle, peregrine falcon, and sandhill crane.

The rangeland and wooded areas interspersed with the farmed areas provide many kinds of habitat that are suited to a variety of game and nongame wildlife species. Fishing is limited primarily to largemouth black bass, catfish, and bluegill, which inhabit ponds and

sloughs on both private and public lands.

The kinds and abundance of wildlife that populate an area depend largely on the amount and distribution of three basic habitat components—food, cover, and water. If any of these components are missing, inadequate, or inaccessible, wildlife will be either scarce or absent. Soil characteristics alone rarely dictate the presence or absence of a particular wildlife species. Along with climate and other factors, however, soils directly affect the kind, amount, and distribution of vegetation available to wildlife for food and cover and commonly influence the availability of water.

The suitability of the soils in the survey area for 12 elements of wildlife habitat is given in table 13. The elements can be identified in the field. Table 13 shows the suitability of each soil for one or more of the elements. These ratings can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for clearing, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element. The soils are rated as well suited, suited, poorly suited, and unsuited to the habitat elements. These ratings are explained in the following paragraphs.

Well suited.—Soil properties are such that the elements of wildlife habitat can easily be improved, maintained, or created. There are few or no soil limitations.

Suited.—Soil properties are such that the elements of wildlife habitat can be improved, maintained, or created. Soil limitations are moderate, and management is needed to maintain the resource base.

Poorly suited.—Soil properties are such that limitations are severe. Creating the desired elements of wildlife habitat may be difficult, and the results are questionable.

Unsuited.—Soil properties are such that limitations are very severe. Improving or creating the desired elements of wildlife habitat is impractical. Unsatisfactory results are probable.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops (nonirrigated) are seed-producing annuals used by wildlife. Examples of suitable plants are wheat and rye. The major soil properties that affect the growth of nonirrigated grain and seed crops are texture of surface layer, available water capacity, soil moisture regime, depth to the water table, the hazard of flooding, permeability, slope, salinity, sodicity, stoniness, soil temperature, and the hazards of water erosion and soil blowing.

Grain and seed crops (irrigated) are seed-producing annuals used by wildlife. Examples of suitable plants are wheat, oats, and barley. The major soil properties that affect the growth of irrigated grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, soil moisture regime, depth to the water table, permeability, slope, salinity, sodicity, stoniness, soil temperature, and the hazard of flooding.

Grasses and legumes (nonirrigated) are seeded domestic grasses and legumes that are used by wildlife for food and cover. Examples of suitable plants are fescue and wheatgrasses. The main soil properties that affect the growth of nonirrigated grasses and legumes are texture of the surface layer, available water capacity, soil moisture regime, depth to the water table, the hazard of flooding, permeability, slope, salinity, sodicity, stoniness, and soil temperature.

Grasses and legumes (irrigated) are seeded domestic grasses and legumes that are used by wildlife for food and cover. Examples of suitable plants are clover and alfalfa. The main soil properties that affect the growth of irrigated grasses and legumes are texture of the surface layer, available water capacity, depth to the water table, the hazard of flooding, permeability, slope, salinity, sodicity, stoniness, and soil temperature.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Examples of suitable plants are native wheatgrasses, native fescue, native bluegrass, wild mustard, lupine, vetches, buckwheat, and saltgrass. The main soil properties that affect the growth of these plants are texture of the surface layer, available water capacity, salinity, soil moisture regime, soil temperature, coarse fragments in the surface layer, and stones on the surface.

Desertic herbaceous plants are native or naturally established herbaceous plants that are used by wildlife for food or cover. They grow on the more arid upland sites. Examples of suitable plants are phlox, aster, yarrow, povertyweed, and primrose. The main soil properties that affect the growth of these plants are texture of the surface layer, available water capacity, salinity, soil moisture regime, coarse fragments in the surface layer, stones and boulders on the surface, and soil temperature.

Shrubs and vines are native or introduced bushy woody plants that produce fruit, buds, twigs, bark, or foliage that is used by wildllife or that produce cover or shade for some species of wildlife. Examples of suitable plants are chokecherry, multiflora rose, wild rose, hawthorn, honeysuckle, and wild plum. The main soil properties that affect the growth of these plants are texture of surface layer, available water capacity, salinity, sodicity, soil temperature, soil moisture regime, coarse fragments in the surface layer, and stones and boulders on the surface. Domestic shrubs require

irrigation during the first 3 years of establishment unless water is available from seeps or springs during the growing season.

Desertic shrubs are native woody shrubs that produce fruit, buds, twigs, bark, and foliage. They provide a substantial part of the food and cover needed by wildlife. Examples of suitable plants are deerbrush, mountainmahogany, bitterbrush, woody phlox, and sagebrush. These shrubs grow on the more arid upland sites. The main soil properties that affect the growth of these plants are texture of the surface layer, available water capacity, depth to the water table, salinity, sodicity, soil moisture regime, soil temperature, coarse fragments in the surface layer, and stones and boulders on the surface.

Riparian shrubs and trees are native or introduced trees or shrubs, or both, that furnish roosting or cover for wildlife or that supply food for wildlife in the form of nuts, buds, twigs, catkins, bark, browse, seeds, or fruit. Native plants are established naturally. Introduced plants may be seeded, transplanted, or planted by cuttings. Riparian shrubs and trees typically grow along drainageways or in low areas where the soils are subject to overflow or are saturated during the growing season. Examples are willow trees and shrubs, cottonwood, Russian-olive, rose, and silver sagebrush. The main soil properties that affect the growth of these plants are available water capacity, depth to the water table, the hazard of flooding, soil temperature, and salinity or sodicity in the surface layer.

Hardwood trees are native and introduced broadleaf trees that provide roosting or cover or that supply food for wildlife in the form of nuts, buds, fruit, twigs, catkins, bark, or foliage. Native plants are established naturally on upland sites. Introduced trees can be transplanted on sites where the soils are 4 or more feet deep. They require irrigation when they are becoming established. Examples of native species are Oregon white oak, Oregon ash, and California black oak. Domestic species include adapted poplars, ash, maples, and oaks. The main soil properties that affect the growth of these plants are available water capacity, depth to the water table, depth to a restrictive layer, soil moisture regime, and soil temperature.

Coniferous trees are native and introduced cone-bearing trees that furnish roosting or cover for wildlife or that supply food, such as browse, buds, and seeds. Native species are established naturally on suitable sites. They can be planted without irrigation on timbered sites. If they are planted elsewhere, irrigation is needed to ensure establishment. The trees should be planted on sites that have well drained soils at least 4 feet deep. Native species include ponderosa pine, incense cedar, Douglas-fir, white fir, and western juniper. Introduced species include redwood, Arizona cypress, and redcedar. The main soil properties that affect the growth of these plants are available water capacity, depth to the water table, depth to a restrictive layer, soil temperature, and soil moisture regime.

Nonsaline wetland plants are native or naturally established herbaceous plants that grow on wetlands, marshes, and other wet sites, including areas of the better drained soils that can be converted to wet soils by artificial flooding. Submerged or floating aquatic plants are excluded. Examples of suitable plants are cattails, tules, rushes, and sedges.

Shallow water areas and reservoirs also are important elements of wildlife habitat. These elements are not rated in table 13, but interpretations for embankments, dikes, and levees and for pond reservoir areas are given in table 17.

The potential for any element of wildlife habitat to occur on a particular site is strongly influenced by soil characteristics. To better understand the relationship between the soils in the survey area and the elements of wildlife habitat, each of the units described under the heading "General Soil Map Units" has been assigned to one of five habitat-soil groups. Each group includes soils that have similar characteristics and that produce, or have the potential to produce, the same elements of wildlife habitat.

Group I: Wetlands.—This group consists of general soil map unit 1 and areas of open water. It includes 122,304 acres, or about 28 percent of the survey area. It is in the Butte Valley, Lower Klamath Lake, and Tule Lake Basin areas. The soils in this group are in basins and on drained lakebeds that commonly are protected by levees. All of the soils have a seasonal high water table. The season when the water table is high is determined mainly by the kind of management that is applied and the capacity of the management system to control the water level, but it is also influenced by the amount of precipitation received.

This group supports nonsaline wetland plants, such as cattails, tules, rushes, and sedges, and includes open water areas, which are an important habitat component but are not directly related to the soil. The areas of nonsaline wetland plants and open water provide habitat primarily for waterfowl, shore birds, and wading birds and for species that are either directly or indirectly dependent on aquatic systems. Hawks, eagles, and other predators make considerable use of the habitat, especially when waterfowl concentrate during migration and nesting. The American bald eagle depends on the waterfowl as a primary food source. Areas that support emergent aquatic vegetation, such as cattails, provide important cover for pheasants, especially in winter.

This group provides irrigated grain and seed crops, irrigated and nonirrigated grasses and legumes, wild herbaceous plants, riparian shrubs and trees, and nonsaline wetland plants.

Important management considerations in areas of this group include preserving both natural and created wetlands; maintaining water-control structures, such as dikes and levees; and managing water impoundments and flooding so that the habitat provides the greatest diversity and amount of aquatic vegetation and sufficient areas of open water.

Group II: Saline Bottoms and Basins.—This group consists of general soil map units 3 and 6. It includes 43,680 acres, or about 10 percent of the survey area. It is on valley floors. The soils in this group typically are very deep, nearly level, poorly drained or very poorly drained, and medium textured or fine textured. The salinity of the soils is slight (where electrical conductivity is 4 to 8 millimhos per centimeter) or moderate (where electrical conductivity is 8 to 16 millimhos per centimeter).

The vegetation in areas of this group is predominantly greasewood, rabbitbrush, saltgrass, peppergrass, and some cheatgrass. The understory vegetation tends to be low growing. The shrubs on these soils provide important areas of cover for deer and antelope, including fawning and kidding areas. A high population of rabbits and rodents provides food for hawks and owls. Pheasants and some kinds of waterfowl and songbirds nest in some areas of this group.

This group provides irrigated grain and seed crops, irrigated grasses and legumes, desertic herbaceous plants, desertic shrubs, and nonsaline wetland plants.

Important management considerations in areas of this group include control of livestock grazing so that the herbaceous understory is maintained, retention of natural wetlands, and retention of brushland.

Group III: Butte Valley Floor and Uplands.—This group consists of general soil map units 2, 4, and 5. It includes 91,728 acres, or about 21 percent of the survey area. It is on alluvial fans and terraces on the floor of Butte Valley. The soils in this group typically are moderately deep to very deep, nearly level to strongly sloping, somewhat excessively drained or well drained, and medium textured or coarse textured.

The natural vegetation in areas of this group includes sagebrush, rabbitbrush, and annual and perennial grasses and forbs. Remnant stands of ponderosa pine are in some areas. Most of the soils have been cleared and are used for irrigated crops, such as potatoes, alfalfa, and grain.

This group provides irrigated grain and seed crops, irrigated and nonirrigated grasses and legumes, wild herbaceous plants, desertic herbaceous plants, desertic shrubs, and coniferous trees.

The habitat in this group is typical of that in intensively farmed areas. Food and water generally are available, but the areas of cropland typically do not provide adequate cover, especially the cover that is needed to provide protection from cold winter winds. The habitat for wildlife generally is limited, and the wildlife species do not reflect a high degree of diversity. Small mammals, such as rabbits and other rodents, and some songbirds and birds of prey use the available habitat. Mourning doves, pheasants, and California valley quail make some use of the cropland in areas where perches and cover are available. Antelope and deer make considerable use of the alfalfa fields throughout the year, especially during winter. The Belding ground squirrel is a pest in the alfalfa fields.

Before a large and diverse wildlife population can be established on the farmland in areas of this group, dependable supplies of drinking water and a plant cover that provides protection from freezing winter winds are needed. This plant cover also provides quail, pheasants, and other wildlife greater protection from predators.

Group IV: Rangeland and Juniper Woodland.—This group consists of general soil map units 8, 9, 10, and 11. It includes 144,144 acres, or about 33 percent of the survey area. It is on hills, mountains, pediments, and the side slopes and other parts of plateaus. The soils in this group are very shallow to moderately deep, nearly level to very steep, well drained, and moderately coarse textured to fine textured. Surface rocks and rock outcrops are common.

The vegetation in areas of this group typically is open to closed stands of juniper mixed with big sagebrush, bitterbrush, and perennial and annual herbaceous plants. Isolated stands of mountainmahogany are at the higher elevations. This group provides important habitat for such wildlife as coyotes, mountain lions, birds of prey, wood rats, rabbits, songbirds, snakes, and lizards. It also provides important summer and winter habitat for deer and antelope. The rock outcrops provide valuable habitat for small mammals and perches for birds of prey.

This group provides wild herbaceous plants, desertic herbaceous plants, desertic shrubs, and coniferous trees.

Important management needs in areas of this group include proper grazing use, a dependable supply of drinking water, and control of brush and juniper.

Group V: Pine-Fir Woodland.—This group consists of general soil map unit 7. It includes 34,944 acres, or about 8 percent of the survey area. It is mainly on mountains. The landscape is dissected by both

perennial and intermittent drainageways. The soils are moderately deep or deep, moderately sloping to steep, well drained, and moderately coarse textured or medium textured. The vegetation in areas of this group is mainly mixed conifers, including ponderosa pine, incense cedar, Douglas-fir, and white fir. The understory plants include buckbrush, bitterbrush, manzanita, and annual and perennial grasses and forbs. Riparian trees and shrubs are along the drainageways.

This group provides wild herbaceous plants, shrubs and vines, riparian shrubs and trees, hardwood trees, and coniferous trees.

This group provides habitat for woodland wildlife, such as deer, black bear, mountain lion, porcupine, birds of prey, and songbirds. Roosevelt elk are occasionally observed in the wooded areas. Small herds of the elk migrate from Oregon. This group provides several important nesting and perching sites for bald eagles.

Important management considerations in areas of this group include retaining broadleaf trees and shrubs within the commercial timber plantations; retaining uneven-aged trees both within and between the plantations; applying timber harvesting practices that protect the soil and plant resources; maintaining the quality of water in streams through the proper design, maintenance, and closing of timber access roads; and retaining significant snags and trees for birds that nest and mammals that inhabit dens.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

Table 14 shows the degree and kind of soil limitations that affect shallow excavations, dwellings without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or

minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 15 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 15 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to

hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 15 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 15 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 16 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand

or gravel, or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and depth to the water table is less than 1 foot. These soils may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 16, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the taxonomic unit descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils generally is preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 17 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a

depth even more than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features listed in tables are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 18 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under "Taxonomic Units and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the system adopted by the American Association of State Highway and Transportation Officials *(1)* and the Unified soil classification system *(2)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SM-SC.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and

in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 19 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under "Taxonomic Units and Their Morphology."

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of the soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill

erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (as much as 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion.

Erosion factor T is an estimate of the maximum average rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils generally are not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 19 the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Tables 20 and 21 give estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflow from streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered to be flooding. Standing water in swamps and marshes or

in closed depressional areas is considered to be ponding.

Table 20 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable, *rare* that it is unlikely but is possible under unusual weather conditions (the chance of flooding in any year is 0 to 5 percent), *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding in any year is 5 to 50 percent), and *frequent* that it occurs often under normal weather conditions (the chance of flooding in any year is more than 50 percent).

Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that flooding is most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and level of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 20 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table usually is highest. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower water table by a dry zone.

Two numbers in the column showing depth to the high water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

In table 21, *depth to bedrock* is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

A *cemented pan* is a cemented or indurated subsurface layer at a depth of 5 feet or less. Such a pan causes difficulty in excavation. Pans are classified as thin or thick. A *thin* pan is one that is less than 3 inches thick if continuously indurated or less than 18 inches thick if discontinuous or fractured. Excavations can be made by trenching machines, backhoes, or small rippers. A *thick* pan is one that is more than 3 inches thick if continuously indurated or more than 18 inches thick if it is discontinuous or fractured. Such a pan is so thick or massive that blasting or special equipment is needed in excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be

needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(16)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 22 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Psammaquents (*Psamm*, meaning sandy texture, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Psammaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is mixed, mesic Typic Psammaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Taxonomic Units and Their Morphology

In this section, each taxonomic unit recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each unit. A pedon, a small three-dimensional area of soil, that is typical of the unit in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(12)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(16)*. Unless otherwise stated, matrix colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the unit.

The map units of each taxonomic unit are described in the section "Detailed Soil Map Units."

Adieux Series

The Adieux series consists of moderately deep, well drained soils in areas of mounds on plateaus. These

soils formed in material weathered from basalt. Slope ranges from 0 to 5 percent.

Soils of the Adieux series are fine-loamy, mixed, mesic Pachic Argixerolls.

Typical pedon of Adieux sandy loam, in the Lequieu-Adieux complex, 0 to 5 percent slopes; 1,500 feet south and 50 feet west of the northeast corner of sec. 35, T. 48 N., R. 6 E. (Carr Butte, N.W. Quadrangle); in an area where stones and cobbles cover about 2 percent of the surface:

A—0 to 4 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine and fine interstitial pores; about 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt1—4 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine interstitial and tubular pores; many thin clay films on faces of peds and lining pores; about 5 percent cobbles and 5 percent pebbles; mildly alkaline; clear smooth boundary.

Bt2—10 to 23 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; common very fine and fine interstitial and few very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; about 5 percent cobbles and 5 percent pebbles; mildly alkaline; gradual smooth boundary.

Bt3—23 to 32 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; few very fine, fine, and medium roots; few very fine and fine interstitial and few fine tubular pores; many moderately thick clay films on faces of peds and lining pores; about 5 percent cobbles and 5 percent pebbles; mildly alkaline; abrupt wavy boundary.

R—32 inches; basalt.

These soils are 20 to 40 inches deep to lithic contact. The mollic epipedon ranges from 20 to 29 inches in thickness. Rock fragments, including pebbles and cobbles, make up 0 to 15 percent of the profile. Stones and cobbles cover 0 to 3 percent of the surface. Reaction is neutral or mildly alkaline throughout the solum.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 or 7.5YR 5/2 and moist color of 10YR 2/2, 3/2, or 3/3 or 7.5YR 3/2. The content of clay ranges from 10 to 18 percent.

The Bt1 and Bt2 horizons have dry color of 10YR 5/2, 5/3, 5/4, or 6/6 or 7.5YR 5/2 or 5/4 and moist color of 10YR 3/2, 3/3, 3/4, 4/2, 4/3, or 4/4 or 7.5YR 3/2 or 4/4. The Bt3 horizon has dry color of 10YR 5/2, 5/3, 5/4, or 6/3 or 7.5YR 5/4 and moist color of 10YR 3/4, 4/2, 4/3, or 4/4 or 7.5YR 4/4. The content of clay ranges from 18 to 27 percent throughout the Bt horizon.

Avis Series

The Avis series consists of very deep, somewhat excessively drained soils on mountains. These soils formed in deposits of volcanic ash. Slope ranges from 5 to 30 percent.

Soils of the Avis series are ashy-skeletal, frigid Dystric Xerorthents.

Typical pedon of Avis stony sandy loam, 5 to 30 percent slopes; 1,600 feet west and 300 feet north of the southeast corner of sec. 32, T. 45 N., R. 2 W. (Penoyar Quadrangle); in an area where stones and cobbles cover about 9 percent of the surface:

A—0 to 9 inches; light brownish gray (10YR 6/2) stony sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few coarse and medium roots; many fine and very fine interstitial pores; about 3 percent stones, 2 percent cobbles, and 5 percent pebbles; medium acid; abrupt smooth boundary.

C1—9 to 17 inches; pale brown (10YR 6/3) very gravelly loamy fine sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and common medium and coarse roots; many very fine and fine interstitial pores; about 2 percent stones, 4 percent cobbles, and 30 percent pebbles; slightly acid; abrupt smooth boundary.

C2—17 to 27 inches; light yellowish brown (10YR 6/4) very gravelly loamy fine sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common fine, medium, and coarse roots; many very fine and fine interstitial pores; about 2 percent stones, 5 percent cobbles, and 40 percent pebbles; slightly acid; abrupt wavy boundary.

2C—27 to 60 inches; light yellowish brown (10YR 6/4) very gravelly sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine

interstitial pores; about 2 percent stones, 5 percent cobbles, and 40 percent pebbles; slightly acid.

Base saturation ranges from 20 to 50 percent throughout the profile. The NaF pH ranges from 10.9 in the surface layer to 9.9 at a depth of 40 to 72 inches. Lava flow rock fragments consisting of cobbles, gravel, and stones are throughout the profile. These fragments make up 35 to 70 percent of the 10- to 40-inch control section. Stones and cobbles cover 5 to 15 percent of the surface.

The A horizon has dry color of 10YR 5/2, 5/3, 6/2, or 6/3 and moist color of 10YR 3/3, 3/4, 4/2, 4/3, or 4/4. Where dark brown (10YR 3/3), the upper part of the A horizon is not thick enough to qualify for a mollic or umbric epipedon. Reaction is neutral to medium acid throughout the horizon.

The C horizon has dry color of 10YR 5/3, 5/4, 6/3, or 6/4 and moist color of 10YR 4/2, 4/3, or 4/4. The texture is very gravelly loamy fine sand, very gravelly loamy sand, or very gravelly sand. Reaction is slightly acid or medium acid.

The 2C horizon has dry color of 10YR 5/4, 6/3, or 6/4 and moist color of 10YR 3/4, 4/3, or 4/4. In some pedons this horizon is very weakly cemented with silica in the upper few inches and has strata of finer textured volcanic ash ¼ inch to 2 inches thick between strata of pyroclastic sand. The texture is very gravelly loamy fine sand, very gravelly loamy sand, or very gravelly sand. Reaction is slightly acid or medium acid.

Bucklake Series

The Bucklake series consists of moderately deep, well drained soils on lava plateaus and mountain side slopes. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 2 to 30 percent.

Soils of the Bucklake series are fine, montmorillonitic, mesic Aridic Argixerolls.

Typical pedon of Bucklake loam, in the Dunnlake-Bucklake-Lequieu complex, 2 to 9 percent slopes; 1,000 feet south and 850 feet east of the northwest corner of sec. 4, T. 45 N., R. 1 W. (Sheep Mountain Quadrangle); in an area where stones and cobbles cover about 2 percent of the surface:

A1—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, slightly sticky and slightly plastic; many very fine and common fine roots; common very fine and fine tubular and few very fine interstitial pores; about 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

A2—4 to 10 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, slightly sticky and slightly plastic; many very fine and common fine roots; common very fine and fine tubular and few very fine interstitial pores; about 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt1—10 to 17 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine, fine, and medium roots; few very fine and fine tubular pores; common moderately thick clay films on faces of peds and lining interstitial pores; about 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bt2—17 to 24 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; few very fine, fine, and medium roots; few very fine and fine tubular pores; common thick clay films on faces of peds and lining interstitial pores; about 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bt3—24 to 35 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; few very fine, fine, and medium roots; few very fine and fine tubular pores; common moderately thick clay films on faces of peds and lining interstitial pores; about 5 percent cobbles and 5 percent pebbles; neutral; abrupt wavy boundary.

R—35 inches; extrusive igneous rock.

The depth to hard, extrusive igneous bedrock ranges from 20 to 40 inches. Rock fragments cover 5 to 50 percent of the surface. The content of clay in the Bt horizon ranges from 27 to 50 percent, but the weighted average in the textural control section ranges from 35 to 50 percent.

The A horizon has dry color of 10YR 5/2 or 7.5YR 5/2 and moist color of 10YR 3/2 or 3/3. The content of clay ranges from 20 to 25 percent. The content of rock fragments, including cobbles and pebbles, ranges from 5 to 50 percent. The texture is very cobbly loam or loam.

The Bt horizon has dry color of 10YR 5/2 or 5/3 or 7.5YR 5/4 and moist color of 10YR 3/2, 3/3, or 4/3 or 7.5YR 4/4. The upper part of this horizon is gravelly clay loam or clay loam and has a clay content of 27 to 35 percent, and the lower part is gravelly clay, gravelly clay loam, clay, or clay loam and has a clay content of 35 to 50 percent. The content of rock fragments, mostly

gravel, ranges from 5 to 25 percent throughout the horizon.

Capjac Series

The Capjac series consists of very deep, poorly drained soils in lake basins. These soils are artificially drained. They formed in lacustrine sediment derived from diatomite and volcanic ash. Slope is 0 to 1 percent.

Soils of the Capjac series are medial, mixed (calcareous), mesic Mollic Andaquepts.

Typical pedon of Capjac silt loam, 0 to 1 percent slopes; 1,900 feet south and 1,500 feet east of the northwest corner of sec. 6, T. 47 N., R. 4 E. (Hatfield Quadrangle):

Ap—0 to 10 inches; gray (10YR 5/1) silt loam, black (10YR 2/1) moist; weak fine granular structure; slightly hard, very friable, weakly smeary, slightly sticky and slightly plastic; common very fine roots; common very fine interstitial and tubular pores; mildly alkaline; clear smooth boundary.

Bw—10 to 26 inches; gray (10YR 6/1) silt loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; hard, friable, moderately smeary, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline; abrupt smooth boundary.

C1—26 to 35 inches; light gray (5Y 7/1) silt loam, black (5Y 2/1) moist; many fine prominent dark yellowish brown (10YR 4/6) mottles; massive; hard, friable, moderately smeary, sticky and slightly plastic; few very fine roots; common very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline; abrupt smooth boundary.

C2—35 to 55 inches; light gray (5Y 7/1) silt loam, olive gray (5Y 4/2) moist; many fine prominent dark yellowish brown (10YR 4/6) mottles; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

C3—55 to 65 inches; light gray (5Y 7/1) silt loam, dark olive gray (5Y 3/2) moist; many fine prominent dark yellowish brown (10YR 4/6) mottles; massive; slightly hard, very friable, slightly sticky and slightly plastic; moderately alkaline.

These soils are calcareous between depths of 10 and 20 inches. The estimated bulk density at ⅓ bar water retention is 0.4 to 0.7 gram per cubic centimeter throughout the profile. The exchange complex is dominated by amorphous material. Reaction is mildly alkaline or moderately alkaline.

The A horizon has dry color of 10YR 4/1 or 5/1 and moist color of 10YR 2/1 or 3/1. The sodium adsorption ratio ranges from 0 to 2. The electrical conductivity is less than 2 millimhos per centimeter. The content of organic matter is 5 to 10 percent.

The Bw horizon has dry color of 10YR 6/1, 6/2, or 7/2 or 2.5Y 6/2 and moist color of 10YR 3/1 or 4/1 or 2.5YR 4/2. The sodium adsorption ratio ranges from 0 to 2. The electrical conductivity is less than 2 millimhos per centimeter.

The C horizon has dry color of 5Y 6/1 or 7/1 and moist color of 5Y 2/1, 3/2, or 4/2. In the upper part of this horizon, the sodium adsorption ratio ranges from 0 to 2 and the electrical conductivity is less than 2 millimhos per centimeter. In the lower part, the sodium adsorption ratio ranges from 2 to 8 and the electrical conductivity ranges from 2 to 8 millimhos per centimeter.

Capona Series

The Capona series consists of moderately deep, well drained soils on terraces and pediments. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 0 to 30 percent.

Soils of the Capona series are fine-loamy, mixed, mesic Aridic Haploxerolls.

Typical pedon of Capona cobbly loam, in the Capona-Rock outcrop complex, 0 to 5 percent slopes; 500 feet south and 1,250 feet west of the northeast corner of sec. 11, T. 46 N., R. 2 E. (Mt. Dome Quadrangle); in an area where stones and cobbles cover about 20 percent the surface:

A1—0 to 3 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; common very fine interstitial pores; about 2 percent stones and 20 percent cobbles; neutral; abrupt smooth boundary.

A2—3 to 10 inches; brown (10YR 5/3) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate medium granular; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine interstitial pores; about 5 percent stones and 20 percent cobbles; neutral; clear smooth boundary.

Bw1—10 to 14 inches; brown (10YR 5/3) cobbly loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very

fine and fine roots; many very fine interstitial pores; about 5 percent stones and 20 percent cobbles; neutral; gradual smooth boundary.

Bw2—14 to 34 inches; brown (10YR 5/3) cobbly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine interstitial pores; about 5 percent stones, 20 percent cobbles, and 5 percent pebbles; neutral; abrupt irregular boundary.

R—34 inches; hard, extrusive igneous rock.

The depth to extrusive igneous bedrock ranges from 20 to 40 inches. The content of clay ranges from 18 to 27 percent in the solum. Reaction is slightly acid or neutral throughout the solum. The content of stones, cobbles, and pebbles ranges, by volume, from 0 to 30 percent throughout the solum.

The A horizon has dry color of 10YR 5/2 or 5/3 and moist color of 10YR 3/2 or 3/3. The texture is cobbly loam or fine sandy loam.

The Bw horizon has dry color of 10YR 5/3 or 6/3 and moist color of 10YR 3/3 or 3/4. The texture is cobbly loam or loam.

The Capona soils in this survey area are at a slightly higher elevation, have a shorter frost-free period, and have a lower mean annual air temperature than is described as the range for the series. These differences, however, do not significantly affect the use and management of the soils.

Dehill Series

The Dehill series consists of very deep, well drained soils on alluvial fans. These soils formed in alluvium derived from extrusive igneous rock. Slope ranges from 0 to 15 percent.

Soils of the Dehill series are coarse-loamy, mixed, mesic Pachic Haploxerolls.

Typical pedon of Dehill fine sandy loam, 0 to 5 percent slopes; 350 feet north and 200 feet east of the southwest corner of sec. 21, T. 48 N., R. 1 E. (Dorris Quadrangle):

A1—0 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine and coarse roots; common very fine interstitial and tubular pores; neutral; clear smooth boundary.

A2—5 to 15 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine and coarse roots; common very fine interstitial and few very fine tubular pores; neutral; clear wavy boundary.

Bt—15 to 27 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; soft, very friable; nonsticky and nonplastic; common fine and medium roots; common very fine interstitial and few very fine tubular pores; few thin clay films bridging mineral grains; neutral; clay wavy boundary.

C1—27 to 44 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine and medium roots; common very fine interstitial pores; neutral; gradual wavy boundary.

C2—44 to 60 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; mildly alkaline.

These soils are more than 60 inches deep. The mollic epipedon and the solum range from 20 to 32 inches in thickness. The content of rock fragments ranges, by volume, from 0 to 5 percent throughout the profile. The content of cobbles ranges from 0 to 2 percent. The content of gravel ranges from 0 to 3 percent. Base saturation (sum of cations) is 75 to 100 percent throughout the solum. The content of organic matter in the solum ranges from 1 to 3 percent.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 and moist color of 10YR 2/2, 3/2, or 3/3. The content of clay ranges from 10 to 16 percent.

The Bt horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 and moist color of 10YR 3/2 or 3/3. It averages 12 to 18 percent clay. It has 1 or 2 percent more clay than the A horizon. Reaction is neutral or mildly alkaline.

The C horizon has dry color of 10YR 4/2, 4/3, 5/3, 5/4, or 6/3 and moist color of 10YR 3/2, 3/3, 3/4, 4/3, or 4/4. Reaction is neutral or mildly alkaline.

Demox Series

The Demox series of very deep, well drained soils on the colluvial side slopes of hills, mountains, and escarpments. These soils formed in colluvium derived from basalt and tuff. Slope ranges from 2 to 50 percent.

Soils of the Demox series are loamy-skeletal, mixed, mesic Pachic Haploxerolls.

Typical pedon of Demox stony sandy loam, 2 to 15 percent slopes; 1,500 feet south and 1,000 feet west of

the northeast corner of sec. 18, T. 46 N., R. 4 E. (Captain Jacks Stronghold Quadrangle):

Oi—1 inch to 0; leaves and stems derived from grasses and forbs; about 10 percent boulders, stones, and cobbles.

A—0 to 12 inches; dark grayish brown (10YR 4/2) stony sandy loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; common very fine interstitial pores; about 10 percent pebbles, 2 percent cobbles, and 5 percent stones; mildly alkaline; clear smooth boundary.

AC—12 to 34 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine interstitial pores; about 30 percent pebbles, 10 percent cobbles, and 5 percent stones; mildly alkaline; gradual wavy boundary.

C—34 to 62 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; about 30 percent pebbles, 10 percent cobbles, and 5 percent stones; mildly alkaline.

The colluvial material is 60 or more inches thick. Reaction is mildly alkaline or moderately alkaline throughout the profile. Stones and cobbles cover 5 to 30 percent of the surface. The content of clay ranges from 10 to 18 percent throughout the profile. The 10- to 40-inch textural control section has 35 to 50 percent rock fragments.

The A horizon has dry color of 10YR 4/2, 5/2, or 5/3 and moist color of 10YR 3/1, 3/2, or 3/3. The content of rock fragments ranges from 15 to 50 percent. The content of stones and cobbles ranges from 5 to 30 percent and that of gravel ranges from 10 to 20 percent. The texture is stony or very stony sandy loam.

The C horizon has dry color of 10YR 5/3, 6/3, or 6/4 or 2.5Y 6/4 and moist color of 10YR 3/3, 4/3, or 4/4. The content of rock fragments ranges from 35 to 50 percent. The content of stones and cobbles ranges from 10 to 20 percent.

Denbar Series

The Denbar series consists of well drained soils on terraces. These soils are deep to a duripan. They formed in alluvium derived from rhyolite, tuff, basalt, and other kinds of extrusive igneous rock. Slope ranges from 0 to 9 percent.

Soils of the Denbar series are fine, montmorillonitic, mesic Pachic Argixerolls.

Typical pedon of Denbar clay loam, in the Salisbury-Denbar complex, 0 to 9 percent slopes; 400 feet north and 2,115 feet east of the southwest corner of sec. 1, T. 46 N., R. 2 E. (Mt. Dome Quadrangle); in an area where stones and cobbles cover about 2 percent of the surface:

A1—0 to 3 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; soft, very friable, sticky and plastic; many very fine roots; many very fine interstitial pores; about 1 percent stones; mildly alkaline; clear smooth boundary.

A2—3 to 8 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; soft, very friable, sticky and plastic; common very fine and fine roots; many very fine interstitial pores; about 2 percent stones, 3 percent cobbles, and 3 percent pebbles; moderately alkaline; clear smooth boundary.

Bt1—8 to 13 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) moist; strong fine subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots; many very fine interstitial pores; many thin clay films on faces of peds; about 1 percent stones, 3 percent cobbles, and 3 percent pebbles; moderately alkaline; clear smooth boundary.

Bt2—13 to 22 inches; brown (10YR 5/3) clay, dark brown (10YR 3/3) moist; strong medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots; common very fine interstitial pores; many moderately thick clay films on faces of peds; about 1 percent stones, 3 percent cobbles, and 3 percent pebbles; moderately alkaline; clear smooth boundary.

Bt3—22 to 29 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; strong medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots; common very fine and fine interstitial pores; common thin clay films on faces of peds; moderately alkaline; clear wavy boundary.

2C1—29 to 34 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; common fine roots; few very fine interstitial pores; strongly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

2C2—34 to 48 inches; very pale brown (10YR 7/3) sandy loam, brown (10YR 4/3) moist; massive; soft,

very friable, slightly sticky and slightly plastic; few fine roots; few very fine interstitial pores; violently effervescent; disseminated lime; about 10 percent pebbles; moderately alkaline; abrupt smooth boundary.

3Cqkm—48 to 60 inches; light yellowish brown (10YR 6/4), indurated duripan, dark yellowish brown (10YR 3/4) moist; massive; extremely hard, extremely firm; brittle; opal laminar cap 1 to 2 millimeters thick; strongly effervescent; seams of lime throughout the horizon; moderately alkaline.

Depth to the duripan ranges from 40 to 60 inches. The thickness of the solum ranges from 25 to 37 inches. The content of rock fragments, including stones, cobbles, and gravel, ranges, by volume, from 0 to 15 percent throughout the profile. The thickness of the mollic epipedon ranges from 20 to 29 inches.

The A horizon has dry color of 10YR 5/2 or 5/3 or 7.5YR 5/2 and moist color of 10YR 3/2 or 7.5YR 3/2. The content of clay ranges from 27 to 35 percent. Reaction is mildly alkaline or moderately alkaline.

The Bt1 and Bt2 horizons have dry color of 10YR 4/2, 5/2, or 5/3 or 7.5YR 5/4 and moist color of 10YR 3/2 or 3/3. The Bt3 horizon has dry color of 10YR 6/3 or 7.5YR 5/4 and moist color of 10YR 4/3 or 4/4 or 7.5YR 4/4. The content of clay ranges from 35 to 50 percent throughout the Bt horizon. The texture is clay loam or clay. Reaction is mildly alkaline or moderately alkaline.

The C horizon has dry color of 10YR 6/3, 6/4, or 7/3 or 7.5YR 6/4 and moist color of 10YR 3/4 or 4/3 or 7.5YR 4/4 or 5/4. The content of clay ranges from 10 to 20 percent.

Doel Series

The Doel series consists of moderately well drained soils on alluvial plains. These soils are moderately deep to a duripan. They formed in alluvium derived from extrusive igneous rock. Slope ranges from 0 to 2 percent.

Soils of the Doel series are coarse-loamy, mixed, mesic Xerollic Durorthids.

Typical pedon of Doel sandy loam, 0 to 2 percent slopes; 550 feet east and 600 feet south of the northwest corner of sec. 18, T. 46 N., R. 2 W. (Macdoel Quadrangle):

A1—0 to 2 inches; light brownish gray (10YR 6/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very thick platy structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine interstitial and tubular pores; strongly effervescent; disseminated lime; moderately alkaline; abrupt wavy boundary.

A2—2 to 7 inches; light brownish gray (10YR 6/2) sandy loam, dark brown (10YR 3/3) moist; strong very thin platy structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine interstitial and tubular pores; strongly effervescent; disseminated lime; moderately alkaline; gradual wavy boundary.

A3—7 to 14 inches; light brownish gray (10YR 6/2) sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; few fine interstitial and tubular pores; strongly effervescent; disseminated lime; moderately alkaline; gradual wavy boundary.

Bt—14 to 21 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine roots; few fine tubular pores; few thin clay bridges between mineral grains; strongly effervescent; disseminated lime; moderately alkaline; gradual wavy boundary.

Bw—21 to 29 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine roots; few fine tubular pores; strongly effervescent; disseminated lime; moderately alkaline; abrupt wavy boundary.

2Cqkm—29 to 34 inches; light gray (10YR 7/1) and very pale brown (10YR 7/3) duripan, brown (10YR 4/3) moist; few fine prominent yellowish brown (10YR 5/6) mottles, common fine prominent brown (7.5YR 4/4) and yellowish red (5YR 4/6) moist; moderate medium, thick, and very thick platy structure; very hard, very firm; brittle; indurated laminar cap and opal coatings 2 to 5 millimeters thick; violently effervescent; seams of lime; moderately alkaline; clear wavy boundary.

2Cq1—34 to 39 inches; light gray (10YR 7/2) duripan, dark grayish brown (10YR 4/2) and brown (10YR 4/3) moist; common fine prominent mottles, brown (7.5YR 4/4) and yellowish red (5YR 4/6) moist; moderate medium platy structure; very hard, very firm; brittle; strongly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

2Cq2—39 to 48 inches; light gray (10YR 7/2) duripan, dark grayish brown (10YR 4/2) moist; strong medium and coarse angular blocky structure; hard, firm; strongly effervescent; disseminated lime; moderately alkaline; abrupt smooth boundary.

3C—48 to 60 inches; dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), and light brownish gray

(10YR 6/2) sand, very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), and grayish brown (10YR 5/2) moist; massive; loose, nonsticky and nonplastic; many very fine interstitial pores; neutral.

Depth to the duripan ranges from 20 to 40 inches. The content of gravel ranges from 0 to 10 percent throughout the profile.

The A horizon has dry color of 10YR 6/1 or 6/2 and moist color of 10YR 3/2, 3/3, 3/4, or 4/2. The content of clay ranges from 5 to 15 percent. Reaction is mildly alkaline or moderately alkaline.

The Bt and Bw horizons have dry color of 10YR 6/1, 6/2, 6/3, or 7/2 and moist color of 10YR 4/2 or 4/3 or 2.5Y 4/2. The Bt horizon has 6 to 17 percent clay. It has about 1 or 2 percent more clay than the A horizon.

The C horizon has dry color of 10YR 4/2, 5/2, 6/2, 6/3, 7/1, 7/2, 7/3, or 8/2 and moist color of 10YR 3/2, 4/2, 4/3, 5/2, or 5/3 or 2.5Y 4/2. The 2Cqkm horizon is indurated. It has a cap 2 to 5 millimeters thick and has opal laminar coatings.

Dotta Series

The Dotta series consists of very deep, well drained soils on alluvial fans. These soils formed in alluvium derived from extrusive igneous rock. Slope ranges from 0 to 5 percent.

Soils of the Dotta series are fine-loamy, mixed, mesic Pachic Argixerolls.

Typical pedon of Dotta sandy loam, 0 to 5 percent slopes; 400 feet south and 1,100 feet west of the northeast corner of sec. 4, T. 47 N., R. 6 E. (Newell Quadrangle):

A1—0 to 5 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; many very fine and fine interstitial pores; slightly acid; clear smooth boundary.

A2—5 to 15 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine, common medium, and few coarse roots; many very fine and fine interstitial and tubular pores; neutral; clear smooth boundary.

Bt1—15 to 25 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine, fine, and medium roots; few very fine interstitial and tubular pores; many thin clay films on faces of peds; mildly alkaline; gradual smooth boundary.

Bt2—25 to 30 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; few very fine, fine, and medium roots; few very fine interstitial and tubular pores; many thin clay films on faces of peds and lining pores; mildly alkaline; abrupt smooth boundary.

C—30 to 60 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; mildly alkaline; gradual wavy boundary.

These soils are more than 60 inches deep. The thickness of the solum ranges from 30 to 50 inches. The mollic epipedon is more than 20 inches thick and has 1 to 3 percent organic matter. The content of gravel ranges from 0 to 10 percent throughout the profile.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 and moist color of 10YR 2/2 or 3/2. The content of clay ranges from 10 to 20 percent.

The Bt horizon has dry color of 10YR 5/2 or 5/3 and moist color of 10YR 3/2 or 3/3. The texture is loam or clay loam. The content of clay ranges from 18 to 27 percent.

The Dotta soils in this survey area are mildly alkaline in the Bt and C horizons. This characteristic is outside the range defined for the series. This difference, however, does not significantly affect the use and management of the soils.

Dunnlake Series

The Dunnlake series consists of shallow, well drained soils on lava or basalt plateaus and mountain side slopes. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 0 to 50 percent.

Soils of the Dunnlake series are clayey, montmorillonitic, mesic Lithic Argixerolls.

Typical pedon of Dunnlake loam, in the Dunnlake-Rangee complex, 0 to 5 percent slopes; 2,532 feet north and 2,321 feet west of the southeast corner of sec. 3, T. 46 N., R. 2 E. (Mt. Dome Quadrangle):

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium platy structure parting to moderate medium granular; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine pores; about 5 percent cobbles and 5 percent pebbles; neutral; abrupt smooth boundary.

Bt1—4 to 7 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; many very fine and fine roots; many very fine interstitial pores; few thin clay films on faces of peds; about 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt2—7 to 10 inches; brown (10YR 5/3) clay, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and few medium roots; many very fine interstitial pores; common thin clay films on faces of peds; about 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt3—10 to 16 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; strong fine subangular blocky structure; hard, firm, sticky and plastic; common fine and few medium roots; many very fine interstitial pores; many moderately thick clay films on faces of peds; about 3 percent cobbles and 5 percent pebbles; neutral; abrupt smooth boundary.

R—16 inches; hard, extrusive igneous rock.

The depth to extrusive igneous bedrock ranges from 12 to 20 inches. The estimated content of organic matter is 1 to 2 percent in the upper 6 inches.

The A horizon has moist color of 10YR 2/2 or 3/2. The content of clay ranges from 18 to 27 percent. The content of rock fragments ranges from 5 to 50 percent. The content of stones and cobbles ranges from 0 to 40 percent, and the content of gravel ranges from 5 to 10 percent. The texture is loam or very stony loam. Reaction is slightly acid or neutral.

The Bt horizon has dry color of 10YR 4/3, 5/2, 5/3, or 5/4 and moist color of 10YR 3/2, 3/3, 3/4, 4/3, or 4/4. The upper part of this horizon is gravelly clay loam or clay loam and has 27 to 35 percent clay. The lower part is gravelly clay loam, gravelly clay, or clay and has 35 to 50 percent clay. The content of rock fragments, mostly gravel, ranges from 5 to 30 percent throughout this horizon. Reaction is slightly acid or neutral in the upper part of the horizon and neutral or mildly alkaline in the lower part. Some pedons have a few pressure faces in the lower part of the horizon.

Eastable Series

The Eastable series consists of very deep, well drained soils on alluvial fans. These soils formed in alluvium derived from tuff and extrusive igneous rock. Slope ranges from 0 to 15 percent.

Soils of the Eastable series are fine-loamy, mixed, mesic Xerollic Camborthids.

Typical pedon of Eastable loam, 0 to 5 percent slopes; 1,820 feet south and 1,100 feet east of the northwest corner of sec. 2, T. 46 N., R. 2 E. (Mt. Dome Quadrangle):

A—0 to 4 inches; light brownish gray (10YR 6/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine, common fine, and few medium roots; many very fine interstitial pores; neutral; clear smooth boundary.

Bt—4 to 18 inches; light brownish gray (10YR 6/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine, common fine, and few medium roots; common very fine interstitial and common very fine tubular pores; few thin clay films lining pores; neutral; clear wavy boundary.

C1—18 to 35 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular pores; mildly alkaline; clear wavy boundary.

C2—35 to 62 inches; very pale brown (10YR 7/3) loam, dark brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular pores; moderately alkaline.

The thickness of the solum ranges from 14 to 24 inches. The content of organic matter ranges from 1 to 3 percent at the surface and decreases regularly as depth increases. The content of gravel ranges from 0 to 10 percent throughout the profile. Reaction is neutral to moderately alkaline throughout the profile.

The A horizon has moist color of 10YR 2/1 or 3/2. The content of clay is 15 to 27 percent.

The Bt horizon has dry color of 10YR 5/2, 6/2, or 6/3 and moist color of 10YR 3/2 or 3/3. It is loam or clay loam. The content of clay ranges from 18 to 30 percent. The average content of clay in this horizon is 1 to 3 percent more than that in the A horizon.

The C horizon has dry color of 10YR 6/2, 6/3, 7/3, 7/4, or 8/2 and moist color of 10YR 3/3, 4/3, 5/4, or 6/2. It has 18 to 27 percent clay.

Esro Series

The Esro series consists of very deep, very poorly drained soils on low stream terraces. These soils formed in alluvium derived from extrusive igneous rock and volcanic ash. Slope ranges from 0 to 2 percent.

Soils of the Esro series are fine-silty, mixed, frigid Cumulic Haplaquolls.

Typical pedon of Esro loam, 0 to 2 percent slopes; 2,200 feet north and 2,600 feet west of the southeast corner of sec. 29, T. 45 N., R. 2 W. (Penoyar Quadrangle):

A1—0 to 5 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots; few fine tubular pores; neutral; clear wavy boundary.

A2—5 to 12 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and medium roots; common very fine and few fine tubular pores; neutral; clear wavy boundary.

A3—12 to 26 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few fine and very fine roots; few fine tubular pores; neutral; clear smooth boundary.

Cg—26 to 40 inches; light gray (10YR 6/1) silty clay loam, very dark grayish brown (10YR 3/2) moist; common fine prominent olive gray (5Y 5/2) and greenish gray (5GY 6/1) mottles; moderate medium subangular blocky structure; hard, firm, very sticky and plastic; few fine and very fine roots; few fine tubular pores; mildly alkaline; abrupt wavy boundary.

2C—40 to 60 inches; light brownish gray (10YR 6/2), stratified sandy clay loam, dark brown (10YR 3/3) moist; many fine to large distinct pale yellow (2.5Y 7/4) and yellow (2.5Y 7/6) mottles; massive; slightly hard, friable, sticky and plastic; mildly alkaline.

The textural control section includes strata of silt loam, loam, silty clay loam, and clay loam. It averages 60 to 75 percent silt and very fine sand and 18 to 30 percent clay.

The A horizon has dry color of 10YR 4/1, 4/2, 5/1, or 5/2 and moist color of 10YR 2/1, 3/1, or 3/2. Reaction is slightly acid or neutral. The content of organic matter ranges from 2 to 6 percent.

The C horizon has dry color of 10YR 6/1, 6/2, 6/3, or 7/1 and moist color of 10YR 3/2, 3/3, 4/1, or 4/2. Reaction is neutral or mildly alkaline. The upper part of this horizon is weakly to strongly gleyed. It is silt loam, silty clay loam, or clay loam. The lower part is dominantly sandy loam, fine sandy loam, or sandy clay loam, but in some pedons it has thin strata of sand. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent throughout this horizon.

Fiddler Series

The Fiddler series consists of moderately deep, well drained soils on hills. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 5 to 30 percent.

Soils of the Fiddler series are clayey-skeletal, montmorillonitic, mesic Typic Argixerolls.

Typical pedon of Fiddler very stony loam, in the Lorella-Fiddler complex, 5 to 30 percent slopes; 1,500 feet west and 1,900 feet south of the northeast corner of sec. 4, T. 47 N., R. 6 E. (Newell Quadrangle); in an area where stones and cobbles cover about 30 percent of the surface:

A—0 to 8 inches; grayish brown (10YR 5/2) very stony loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many very fine and common fine roots; common very fine tubular pores; about 20 percent stones, 5 percent cobbles, and 10 percent pebbles; neutral; clear smooth boundary.

Bt1—8 to 11 inches; brown (7.5YR 5/2) very stony clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine tubular pores; common moderately thick clay films on faces of peds; about 20 percent stones, 5 percent cobbles, and 10 percent pebbles; neutral; clear smooth boundary.

Bt2—11 to 21 inches; brown (7.5YR 5/4) very stony clay, dark brown (7.5YR 4/4) moist; strong medium subangular blocky structure; very hard, very firm, sticky and very plastic; common very fine roots; few very fine tubular pores; continuous moderately thick clay films on faces of peds; about 25 percent stones, 5 percent cobbles, and 10 percent pebbles; neutral; clear smooth boundary.

Bt3—21 to 26 inches; strong brown (7.5YR 5/6) very stony clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine roots; few very fine tubular pores; common moderately thick clay films on faces of peds; about 20 percent stones, 10 percent cobbles, and 10 percent pebbles; slightly acid; abrupt irregular boundary.

R—26 inches; dark gray (N 4/0), fractured basalt.

The thickness of the solum and the depth to extrusive igneous bedrock, primarily basalt, range from 20 to 40 inches. The mollic epipedon is 8 to 20 inches

thick, and in some pedons it includes the upper part of the argillic horizon. Reaction is slightly acid or neutral throughout the solum.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 and moist color of 10YR 2/2 or 3/2. The content of clay ranges from 18 to 27 percent. The content of rock fragments ranges from 15 to 55 percent. The content of stones and cobbles ranges from 15 to 40 percent. The content of gravel ranges from 0 to 15 percent.

The Bt horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 or 7.5YR 4/4, 5/2, 5/4, or 5/6 and moist color of 10YR 3/2, 3/3, or 3/4 or 7.5YR 3/2, 3/4, or 4/4. It is very stony clay loam or very stony clay and has 35 to 50 percent clay. The content of rock fragments ranges from 35 to 55 percent. The content of stones and cobbles ranges from 25 to 35 percent. The content of gravel ranges from 10 to 20 percent.

Forbar Series

The Forbar series consists of very deep, very poorly drained soils in lake basins. These soils are artificially drained. They formed in alluvium derived from tuff and lacustrine sediment. Slope ranges from 0 to 2 percent.

Soils of the Forbar series are mixed, mesic Typic Psammaquents.

Typical pedon of Forbar fine sand, 0 to 2 percent slopes; 3,500 feet east and 1,400 feet north of the southwest corner of sec. 10, T. 47 N., R. 2 E. (Lower Klamath Lake Quadrangle):

A—0 to 2 inches; light brownish gray (2.5Y 6/2) fine sand, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine interstitial and common very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline; abrupt smooth boundary.

AC—2 to 7 inches; light brownish gray (2.5Y 6/2) fine sand, dark grayish brown (2.5Y 4/2) moist; common large prominent strong brown (7.5YR 5/6) mottles; single grain; nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; about 8 percent pebbles; slightly effervescent; disseminated lime; mildly alkaline; abrupt smooth boundary.

C1—7 to 31 inches; light yellowish brown (10YR 6/4) fine sand, dark yellowish brown (10YR 4/4) moist; many large distinct yellowish red (5YR 5/6) mottles; single grain; nonsticky and nonplastic; common fine roots; few very fine interstitial pores; slightly acid; abrupt smooth boundary.

C2—31 to 43 inches; light yellowish brown (10YR 6/4) fine sand, dark yellowish brown (10YR 3/4) moist; common medium distinct yellowish red (5YR 4/6) mottles; single grain; nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; neutral; abrupt smooth boundary.

2C—43 to 50 inches; light gray (10YR 7/2) fine sand, dark grayish brown (10YR 4/2) moist; single grain; nonsticky and nonplastic; few very fine roots; common very fine interstitial pores; neutral; abrupt smooth boundary.

2Cq—50 to 55 inches; very pale brown (10YR 7/3) fine sand, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine interstitial pores; about 10 percent pebbles; neutral; abrupt smooth boundary.

2C′—55 to 60 inches; very pale brown (10YR 7/3) fine sand, brown (10YR 4/3) moist; single grain; nonsticky and nonplastic; few very fine interstitial pores; about 14 percent pebbles; slightly effervescent; disseminated lime; moderately alkaline.

The thickness of the solum ranges from 2 to 6 inches. Carbonates are in the A horizon and occur in an erratic pattern with increasing depth in the C horizon. The content of clay ranges from 0 to 5 percent throughout the profile, and the content of coarse and very coarse sand ranges from 10 to 20 percent. Reaction is slightly acid or neutral in most of the textural control section.

The A horizon has dry color of 10YR 6/2 or 6/3 or 2.5Y 6/2 and moist color of 10YR 4/2 or 2.5Y 4/2. The content of gravel ranges from 0 to 10 percent. Reaction is mildly alkaline or moderately alkaline.

The AC horizon has dry color of 10YR 6/2, 6/3, or 7/2 or 2.5Y 6/2 or 7/2 and moist color of 10YR 4/2, 4/3, or 5/2 or 2.5YR 4/2 or 5/2. In all pedons it is mottled with 10YR 5/6 or 6/6 or 7.5YR 5/6. The content of gravel ranges from 0 to 10 percent.

The C horizon has dry color of 10YR 6/4, 7/2, or 7/3 or 2.5Y 6/2 and moist color of 10YR 3/4, 4/2, 4/3, or 4/4. It is mottled in all pedons. The content of gravel ranges from 0 to 15 percent. Reaction is slightly acid to moderately alkaline.

Fordney Series

The Fordney series consists of very deep, excessively drained soils on terraces. These soils formed in alluvial and lacustrine sediment derived dominantly from weathered tuff. Slope ranges from 0 to 15 percent.

Soils of the Fordney series are sandy, mixed, mesic Torripsammentic Haploxerolls.

Typical pedon of the Fordney loamy fine sand, 0 to 2 percent slopes; 2,600 feet east and 2,600 feet south of

the northwest corner of sec. 17, T. 46 N., R. 1 W. (Macdoel Quadrangle):

Ap—0 to 9 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots; common very fine interstitial pores; neutral; gradual smooth boundary.

C1—9 to 15 inches; grayish brown (10YR 5/2) loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; common very fine interstitial pores; mildly alkaline; gradual wavy boundary.

C2—15 to 60 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; mildly alkaline.

Reaction ranges from neutral to moderately alkaline throughout the profile. The A horizon has dry color of 10YR 5/1 or 5/2 and moist color of 10YR 2/2 or 3/2. The C horizon has dry color of 10YR 5/2, 5/3, 6/2, or 6/3 and moist color of 10YR 3/3, 4/2, 4/3, or 5/3. It is loamy sand, loamy fine sand, or sand. The content of gravel in this horizon ranges from 0 to 5 percent.

Fredonyer Series

The Fredonyer series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 5 to 50 percent.

Soils of the Fredonyer series are loamy-skeletal, mixed, frigid Pachic Haploxerolls.

Typical pedon of Fredonyer very stony loam, in the Fredonyer-Rock outcrop complex, 30 to 50 percent slopes; 1,050 feet west and 530 feet north of the southeast corner of sec. 24, T. 46 N., R. 2 E. (Mt. Dome Quadrangle); in an area where stones and cobbles cover about 40 percent of the surface:

A1—0 to 3 inches; dark grayish brown (10YR 4/2) very stony loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and plastic; many very fine and fine roots; many very fine interstitial and tubular pores; about 20 percent stones, 15 percent cobbles, and 15 percent pebbles; slightly acid; clear smooth boundary.

A2—3 to 10 inches; dark grayish brown (10YR 4/2) very stony loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and plastic; many very fine and fine roots; many very fine interstitial and tubular pores; about 20 percent stones, 15 percent cobbles, and 15 percent pebbles; neutral; clear smooth boundary.

Bw1—10 to 18 inches; grayish brown (10YR 5/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and plastic; many very fine and fine and common medium roots; many very fine interstitial and tubular pores; few thin clay films bridging sand grains; about 25 percent cobbles, 10 percent stones, and 20 percent pebbles; neutral; clear smooth boundary.

Bw2—18 to 25 inches; grayish brown (10YR 5/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and plastic; many very fine and fine and common medium roots; many very fine interstitial and tubular pores; few thin clay films bridging sand grains; about 25 percent cobbles, 10 percent stones, and 20 percent pebbles; neutral; clear wavy boundary.

R—25 inches; hard, extrusive igneous rock.

The depth to extrusive igneous bedrock ranges from 20 to 40 inches. Reaction is slightly acid or neutral throughout the solum. The mollic epipedon is 20 to 25 inches thick. The content of organic matter ranges from 1 to 3 percent in the upper 20 inches.

The A horizon has dry color of 10YR 4/2 or 5/2 and moist color of 10YR 3/2 or 3/3. The content of rock fragments ranges from 35 to 55 percent. The content of stones ranges from 15 to 20 percent. The content of cobbles ranges from 10 to 15 percent. The content of gravel ranges from 10 to 20 percent. The content of clay ranges from 15 to 22 percent.

The Bw horizon has dry color of 10YR 5/2 or 5/3 or 7.5YR 5/2 and moist color of 10YR 3/2, 3/3, or 3/4. The content of clay averages 18 to 25 percent. This horizon has 1 or 2 percent more clay than the A horizon. It has 50 to 60 percent rock fragments. The content of stones ranges from 5 to 10 percent. The content of cobbles ranges from 25 to 30 percent. The content of gravel ranges from 20 to 25 percent.

Hedox Series

The Hedox series consists of moderately deep, well drained soils on hills and the side slopes of plateaus. These soils formed in material weathered from diatomite and tuff. Slope ranges from 2 to 30 percent.

Soils of the Hedox series are fine-loamy, mixed, nonacid, mesic Xeric Torriorthents.

Typical pedon of Hedox loam, in the Hedox-Porterfield complex, 15 to 30 percent slopes; 50 feet

east and 200 feet south of the northwest corner of sec. 10, T. 46 N., R. 2 E. (Mt. Dome Quadrangle):

A1—0 to 3 inches; light gray (10YR 7/2) loam, dark brown (10YR 3/3) moist; weak medium granular structure; loose, very friable, slightly sticky and slightly plastic; common very fine and few fine and medium roots; many very fine interstitial pores; about 9 percent pebbles and 3 percent cobbles; neutral; clear smooth boundary.

A2—3 to 8 inches; very pale brown (10YR 7/3) loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine and medium roots; many very fine interstitial pores; about 6 percent pebbles and 3 percent cobbles; neutral; clear smooth boundary.

C1—8 to 19 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine interstitial pores; about 6 percent pebbles and 3 percent cobbles; neutral; clear smooth boundary.

C2—19 to 27 inches; very pale brown (10YR 8/3) gravelly loam, pale brown (10YR 6/3) moist; massive; soft, very friable, slightly sticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; about 15 percent pebbles and 10 percent cobbles; neutral; abrupt smooth boundary.

Cr—27 inches; weathered diatomite and tuff.

The depth to weathered bedrock ranges from 20 to 40 inches. The content of clay ranges from 18 to 25 percent in the A and C horizons.

The A horizon has dry color of 10YR 6/2, 6/3, 7/2, or 7/3 and moist color of 10YR 3/2, 3/3, 4/2, or 4/3. The content of rock fragments ranges, by volume, from 0 to 30 percent. The texture is loam or stony loam. This horizon ranges from 7 to 15 inches in thickness.

The C horizon has dry color of 10YR 6/3, 7/3, or 8/3 and moist color of 10YR 5/3 or 6/3. The content of rock fragments ranges, by volume, from 5 to 30 percent in the upper part of this horizon and from 15 to 30 percent in the lower part. The lower part is neutral or mildly alkaline.

Henley Series

The Henley series consists of somewhat poorly drained, sodic soils on low terraces. These soils are moderately deep to a duripan. They formed in mixed alluvium derived dominantly from lacustrine sediment, volcanic ash, diatomite, and extrusive igneous rock. Slope ranges from 0 to 2 percent.

Soils of the Henley series are coarse-loamy, mixed, mesic Aquic Durorthids.

Typical pedon of Henley sandy loam, in the Laki-Henley complex, 0 to 2 percent slopes; 1,850 feet north and 1,250 feet west of the southeast corner of sec. 18, T. 48 N., R. 3 E. (Lower Klamath Lake Quadrangle):

A1—0 to 4 inches; light brownish gray (10YR 6/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; many very fine interstitial pores; strongly effervescent; strongly alkaline; clear smooth boundary.

A2—4 to 11 inches; light brownish gray (10YR 6/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine interstitial and tubular pores; strongly effervescent; strongly alkaline; clear smooth boundary.

Bk1—11 to 20 inches; light gray (10YR 7/2) fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft; very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; many very fine interstitial and tubular pores; strongly effervescent; strongly alkaline; clear wavy boundary.

Bk2—20 to 25 inches; light gray (10YR 7/2) fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; many very fine interstitial and tubular pores; strongly effervescent; strongly alkaline; abrupt smooth boundary.

Bqm—25 to 31 inches; light gray (10YR 7/2) duripan, brown (10YR 5/3) moist; very hard, very firm; strongly alkaline; abrupt smooth boundary.

2C—31 to 60 inches; light gray (10YR 7/2), stratified silt loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; moderately alkaline.

Depth to the duripan ranges from 20 to 40 inches. The sodium adsorption ratio is more than 15 percent in all or part of the upper 20 inches. The electrical conductivity ranges from 2 to 8 millimhos per centimeter.

The A horizon ranges from 10 to 20 inches in thickness. It has dry color of 10YR 6/1, 6/2, or 7/2 and moist color of 10YR 3/2 or 4/2. The content of clay ranges from 10 to 18 percent. Reaction is strongly alkaline or very strongly alkaline.

The Bk horizon has dry color of 10YR 6/1, 6/2, or 7/2

and moist color of 10YR 3/3, 4/2, or 4/3. The texture is sandy loam, fine sandy loam, or loam. The content of clay ranges from 10 to 18 percent. Reaction is moderately alkaline or strongly alkaline.

Inlow Series

The Inlow series consists of moderately well drained soils on lake terraces. These soils are moderately deep to a duripan. They formed in lacustrine deposits and in alluvium derived from volcanic ash and extrusive igneous rock. Slope ranges from 0 to 2 percent.

Soils of the Inlow series are fine-loamy, mixed, mesic Haploxerollic Nadurargids.

Typical pedon of Inlow silt loam, in the Inlow-Ocho-Modoc complex, 0 to 2 percent slopes; 1,900 feet west and 400 feet south of the northeast corner of sec. 14, T. 47 N., R. 1 W. (Dorris Quadrangle):

A1—0 to 3 inches; light gray (10YR 7/1) silt loam, grayish brown (10YR 5/2) moist; weak medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine vesicular and few very fine tubular pores; moderately alkaline; clear smooth boundary.

A2—3 to 8 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate thin platy structure; slightly hard, friable, slightly sticky and plastic; many very fine and fine and few medium roots; many very fine interstitial and vesicular and few very fine tubular pores; moderately alkaline; clear wavy boundary.

A3—8 to 13 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine and fine roots; common very fine interstitial and few very fine tubular pores; moderately alkaline; clear wavy boundary.

Btn1—13 to 23 inches; light gray (10YR 7/2) silt loam, brown (10YR 5/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; common very fine and fine and few medium roots; few very fine interstitial and tubular pores; common moderately thick clay films on faces of peds and lining pores; strongly alkaline; clear wavy boundary.

Btn2—23 to 33 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine and few medium roots; few very fine interstitial and tubular pores; common moderately thick clay films on faces of peds and lining pores; strongly alkaline; abrupt wavy boundary.

Bqkm1—33 to 42 inches; very pale brown (10YR 7/3), strongly cemented duripan, brown (10YR 5/3) moist; massive; extremely hard, very firm; brittle; common thin clay films lining pores; strongly effervescent; disseminated lime; few coatings of silica; strongly alkaline; gradual smooth boundary.

Bqkm2—42 to 59 inches; very pale brown (10YR 7/3), strongly cemented duripan, brown (10YR 5/3) moist; common medium distinct strong brown (7.5YR 5/8) mottles; massive; very hard, very firm; brittle; common thin clay films lining pores; strongly effervescent; disseminated lime; strongly alkaline; abrupt smooth boundary.

2C—59 to 69 inches; light gray (10YR 7/2) loamy fine sand, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; strongly effervescent; disseminated lime; strongly alkaline.

Depth to the duripan and the thickness of the solum range from 20 to 40 inches. The content of gravel ranges from 0 to 5 percent throughout the profile. The exchangeable sodium percentage is 35 to 80 in the textural control section.

The A horizon has dry color of 10YR 6/1, 6/2, 7/1, or 7/2 and moist color of 10YR 3/2, 3/3, 4/2, or 5/2. It has 10 to 15 percent clay. Reaction is mildly alkaline or moderately alkaline. The electrical conductivity is less than 2 millimhos per centimeter.

The Bt horizon has dry color of 10YR 5/2, 5/3, 6/1, 6/2, 6/3, 7/1, 7/2, or 7/3 and moist color of 10YR 3/3, 4/2, 4/3, or 5/3. Reaction is strongly alkaline or very strongly alkaline. This horizon is silt loam, loam, or clay loam and averages 18 to 35 percent clay. It has at least 4 percent more clay than the A horizon. The electrical conductivity ranges from 2 to 4 millimhos per centimeter.

The Bqkm horizon is very firm or extremely firm when moist. It ranges from 22 to 30 inches in thickness.

The 2C horizon has dry color of 10YR 6/2, 6/3, 7/2, 7/3, or 8/3 and moist color of 10YR 4/2, 4/3, 5/2, 5/3, or 5/4. Reaction is strongly alkaline or very strongly alkaline. The texture is fine sand, loamy fine sand, or loamy sand. The content of clay ranges from 0 to 10 percent. The electrical conductivity ranges from 2 to 4 millimhos per centimeter.

Kalo Series

The Kalo series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 5 to 50 percent.

Soils of the Kalo series are loamy-skeletal, mixed, frigid Ultic Argixerolls.

Typical pedon of Kalo stony sandy loam, 5 to 30 percent slopes; 2,100 feet north and 3,000 feet west of the southeast corner of sec. 17, T. 47 N., R. 2 W. (Sams Neck Quadrangle):

Oi—2 inches to 0; undecomposed and partially decomposed needles, bark, grass blades, and other organic debris; about 10 percent stones and cobbles.

A—0 to 5 inches; brown (7.5YR 4/2) stony sandy loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine interstitial pores; about 7 percent stones, 5 percent cobbles, and 5 percent pebbles; slightly acid; clear wavy boundary.

Bt1—5 to 11 inches; brown (7.5YR 5/2) very cobbly loam, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; few very fine and fine tubular pores; few thin clay films on faces of peds; about 10 percent stones, 20 percent cobbles, and 10 percent pebbles; slightly acid; gradual wavy boundary.

Bt2—11 to 19 inches; brown (7.5YR 5/4) very cobbly clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine and few medium and coarse roots; few very fine and fine tubular pores; common thin clay films on faces of peds; about 10 percent stones, 20 percent cobbles, and 10 percent pebbles; slightly acid; gradual wavy boundary.

Bt3—19 to 27 inches; brown (7.5YR 5/2) very cobbly clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine and few medium and coarse roots; few very fine and fine tubular pores; few moderately thick clay films on faces of peds; about 10 percent stones, 20 percent cobbles, and 10 percent pebbles; slightly acid; abrupt wavy boundary.

R—27 inches; hard, extrusive igneous rock.

The depth to hard, extrusive igneous bedrock ranges from 20 to 40 inches. The mollic epipedon is 10 to 15 inches thick. Base saturation (by sum of cations) ranges from 60 to 75 percent. Reaction is medium acid or slightly acid throughout the solum. The content of organic matter ranges from 1 to 3 percent in the upper 11 inches.

The A horizon has dry color of 7.5YR 4/2, 4/4, or 5/2 or 5YR 4/2, 4/3, 5/2, or 5/3 and moist color of 7.5YR 3/2 or 5YR 3/2 or 3/3. The content of clay ranges from 10 to 20 percent. The content of rock fragments ranges from 15 to 45 percent. The content of stones and cobbles ranges from 10 to 35 percent. The content of gravel ranges from 5 to 10 percent. The texture is stony or very stony sandy loam.

The Bt horizon has dry color of 7.5YR 5/2 or 5/4 or 5YR 5/3, 5/4, 5/6, 6/2, 6/3, or 6/4 and moist color of 7.5YR 3/2 or 3/4 or 5YR 3/3, 3/4, or 4/3. It is very cobbly loam or very cobbly clay loam. The content of clay averages 20 to 32 percent. This horizon has 5 to 12 percent more clay than the A horizon. The content of rock fragments ranges from 35 to 55 percent. The content of stones ranges from 5 to 10 percent. The content of cobbles ranges from 20 to 30 percent. The content of gravel ranges from 10 to 15 percent.

Karoc Series

The Karoc series consists of very deep, well drained soils on colluvial side slopes. These soils formed in colluvium derived from tuff and andesite. Slope ranges from 50 to 75 percent.

Soils of the Karoc series are loamy-skeletal, mixed, nonacid, mesic Xeric Torriorthents.

Typical pedon of Karoc very gravelly sandy loam, in the Karoc-Rock outcrop complex, 50 to 75 percent slopes; 475 feet north and 2,050 feet west of the southeast corner of sec. 6, T. 46 N., R. 4 E. (Captain Jacks Stronghold Quadrangle); in an area where cobbles cover about 7 percent of the surface:

A—0 to 3 inches; dark grayish brown (10YR 4/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure, soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; common very fine interstitial pores; about 45 percent pebbles, 10 percent cobbles, and 2 percent stones; neutral; clear smooth boundary.

C1—3 to 13 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; few very fine interstitial and common very fine tubular pores; about 45 percent pebbles, 10 percent cobbles, and 1 percent stones; neutral; clear smooth boundary.

C2—13 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; common very fine interstitial pores; about 45 percent pebbles, 10 percent cobbles, and 1 percent stones; neutral.

The colluvium is more than 60 inches thick. The

content of rock fragments ranges from 35 to 60 percent throughout the profile. The content of stones and cobbles ranges from 5 to 15 percent. The content of gravel ranges from 30 to 45 percent. The content of clay ranges from 10 to 18 percent. Reaction is neutral or mildly alkaline throughout the profile.

The A horizon has dry color of 10YR 4/2, 5/2, or 6/3 and moist color of 10YR 3/2 or 3/3. The C horizon has dry color of 10YR 6/2, 6/3, or 6/4 or 7.5YR 5/4 and moist color of 10YR 3/3, 3/4, or 4/3 or 7.5YR 4/4.

Laki Series

The Laki series consists of very deep, moderately well drained soils on terraces. These soils formed in lacustrine and alluvial material derived from basalt, tuff, diatomite, and volcanic ash. Slope ranges from 0 to 2 percent.

Soils of the Laki series are fine-loamy, mixed, mesic Typic Haploxerolls.

Typical pedon of Laki fine sandy loam, 0 to 2 percent slopes; 500 feet south and 900 feet east of the northwest corner of sec. 24, T. 48 N., R. 4 E. (Tulelake Quadrangle):

Ap—0 to 7 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; slightly effervescent; moderately alkaline; clear smooth boundary.

A—7 to 12 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw—12 to 34 inches; light brownish gray (10YR 6/2) and light gray (10YR 7/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few very fine roots; common very fine interstitial and tubular pores; strongly effervescent; strongly alkaline; clear wavy boundary.

C—34 to 60 inches; very pale brown (10YR 8/3) loam, pale brown (10YR 6/3) moist; massive; slightly hard, friable, slightly sticky and plastic; few very fine roots; common very fine interstitial pores; violently effervescent; strongly alkaline.

The alluvial and lacustrine material is 60 or more inches thick. The mollic epipedon is 10 to 18 inches thick. The sodium adsorption ratio varies with increasing depth. It commonly ranges from 10 to 25 but generally is lower in the surface layer as a result of sprinkler irrigation and additions of soil amendments. The electrical conductivity ranges from 4 to 8 millimhos per centimeter. Reaction is moderately alkaline or strongly alkaline throughout the profile.

The A horizon has dry color of 10YR 4/2 or 5/2 and moist color of 10YR 3/1 or 3/2. The content of clay ranges from 10 to 18 percent.

The B horizon has dry color of 10YR 6/2, 6/3, or 7/2 and moist color of 10YR 4/2 or 4/3. The texture is fine sandy loam or loam. The content of clay is 18 to 25 percent.

The C horizon has dry color of 10YR 7/2, 7/3, 8/2, or 8/3 or 2.5Y 7/2 and moist color of 10YR 5/2, 5/3, 6/2, or 6/3 or 2.5Y 6/2. The content of clay ranges from 18 to 25 percent.

Lalos Series

The Lalos series consists of very deep, well drained soils in areas of dunes on lakeshores. These soils formed in eolian deposits derived from lacustrine sediment. Slope ranges from 2 to 15 percent.

Soils of the Lalos series are coarse-silty, mixed, mesic Xerollic Camborthids.

Typical pedon of Lalos very fine sandy loam, 2 to 15 percent slopes; 1,800 feet east and 1,550 feet north of the southwest corner of sec. 15, T. 48 N., R. 3 E. (Hatfield Quadrangle):

A—0 to 7 inches; light brownish gray (10YR 6/2) very fine sandy loam, brown (10YR 5/3) moist; weak medium subangular blocky structure parting to weak medium granular; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine interstitial and few very fine tubular pores; violently effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

Bw—7 to 13 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine and medium roots; common very fine tubular pores; violently effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

2Bw1—13 to 20 inches; light gray (10YR 7/2) loam, pale brown (10YR 6/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine, fine, and medium tubular pores; strongly effervescent; disseminated lime; strongly alkaline; clear wavy boundary.

2Bw2—20 to 30 inches; pinkish gray (7.5YR 7/2) clay

loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common fine and medium and few very fine tubular pores; strongly effervescent; disseminated lime; strongly alkaline; abrupt wavy boundary.

3C1—30 to 54 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; massive; soft, very friable, nonsticky and slightly plastic; few very fine roots; many very fine tubular pores; strongly effervescent; disseminated lime; very strongly alkaline; gradual wavy boundary.

3C2—54 to 65 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial and tubular pores; strongly effervescent; disseminated lime; very strongly alkaline.

The eolian material is more than 60 inches thick. The 10- to 40-inch control section has 10 to 15 percent fine sand or coarser sand. Bulk density ranges from 0.9 to 1.0 gram per cubic centimeter. The ratio of 15-bar water content to measured clay is 1.0 to 2.45.

The A horizon has dry color of 10YR 6/1, 6/2, or 6/3 and moist color of 10YR 3/2, 3/3, 4/3, or 5/3. The electrical conductivity ranges from 0 to 4 millimhos per centimeter. The exchangeable sodium percentage ranges from 10 to 40.

The 2Bw horizon has dry color of 10YR 7/2 or 7.5YR 7/2 or 7/3 and moist color of 10YR 4/2, 4/3, 6/3, or 6/4. The exchangeable sodium percentage ranges from 49 to 64. This horizon has no clay films. The electrical conductivity ranges from 4 to 8 millimhos per centimeter.

The C horizon has dry color of 10YR 6/2, 6/3, or 7/3 and moist color of 10YR 3/4, 4/2, 4/3, 4/4, or 6/3. The texture is loam or very fine sandy loam. The electrical conductivity ranges from 8 to 16 millimhos per centimeter. The sodium adsorption ratio ranges from 70 to 90.

Lamath Series

The Lamath series consists of very deep, poorly drained soils in lake basins. These soils are artificially drained. They formed in stratified lacustrine sediment derived from diatomite, volcanic ash, and extrusive igneous rock. Slope is 0 to 1 percent.

Soils of the Lamath series are medial over sandy or sandy-skeletal, mixed (calcareous), mesic Haplic Andaquepts.

Typical pedon of Lamath silt loam, 0 to 1 percent slopes; 515 feet north and 3,478 feet east of the southwest corner of sec. 28, T. 48 N., R. 2 E. (Sheepy Lake Quadrangle):

A—0 to 4 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

Bw1—4 to 13 inches; light gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; few fine distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common medium roots; many very fine interstitial and few fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline; abrupt smooth boundary.

Bw2—13 to 21 inches; light gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; few medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and common medium roots; many very fine interstitial and common very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline; abrupt smooth boundary.

2C1—21 to 28 inches; light brownish gray (2.5Y 6/2) sand, dark grayish brown (2.5Y 4/2) moist; many medium distinct yellowish brown (10YR 5/8) mottles; single grain; loose, nonsticky and nonplastic; many very fine and common medium roots; many very fine interstitial pores; slightly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

2C2—28 to 37 inches; light brownish gray (2.5Y 6/2) sand, dark grayish brown (2.5Y 4/2) moist; many medium distinct yellowish brown (10YR 5/8) mottles; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; moderately alkaline; abrupt wavy boundary.

2C3—37 to 44 inches; grayish brown (10YR 5/2) loamy sand, dark grayish brown (10YR 4/2) moist; common medium distinct yellowish brown (10YR 5/8) mottles; massive; soft, very friable, slightly sticky and slightly plastic; common very fine interstitial pores; moderately alkaline; abrupt wavy boundary.

2C4—44 to 53 inches; light gray (10YR 6/1) sand, very dark gray (10YR 3/1) moist; massive; soft, very friable, nonsticky and nonplastic; mildly alkaline; abrupt smooth boundary.

2C5—53 to 55 inches; light gray (10YR 7/1) loam, gray (10YR 5/1) moist; massive; hard, firm, slightly sticky and plastic; slightly acid; abrupt smooth boundary.

2C6—55 to 60 inches; light gray (10YR 6/1) sand, very dark gray (10YR 3/1) moist; massive; soft, very friable, nonsticky and nonplastic; slightly acid.

The alluvial material is more than 60 inches thick. The upper 26 to 34 inches is calcareous in all parts. The solum is 15 to 25 inches thick. It has a bulk density of 0.4 to 0.65 gram per cubic centimeter. The sodium adsorption ratio ranges from 2 to 8.

The A horizon has dry color of 10YR 4/1, 5/1, 6/1, or 7/2 or 2.5Y 4/1 or 6/2 and moist color of 10YR 2/1, 3/1, 3/3, 4/1, or 5/2 or 2.5Y 4.2. Reaction is mildly alkaline or moderately alkaline. The electrical conductivity ranges from 2 to 4 millimhos per centimeter. The content of organic matter ranges from 5 to 10 percent.

The Bw horizon has dry color of 10YR 6/1, 6/2, 7/1, or 7/2 and moist color of 10YR 3/1, 4/1, 4/2, or 5/2. The electrical conductivity ranges from 2 to 4 millimhos per centimeter.

The 2C horizon has dry color of 2.5Y 6/2, 7/2, or 8/2 or 10YR 5/2, 6/1, or 7/1 and moist color of 2.5Y 4/2 or 5/2 or 10YR 3/1, 4/2, or 5/1. Reaction is mildly alkaline or moderately alkaline in the upper part of this horizon and slightly acid or neutral in the lower part. The content of gravel 25 millimeters in size ranges from 0 to 5 percent throughout this horizon. The upper part of the horizon is sand or loamy sand and has 0 to 6 percent clay. The lower part is stratified sand to loam and has 0 to 15 percent clay. The electrical conductivity ranges from 2 to 8 millimhos per centimeter throughout the horizon.

Leavers Series

The Leavers series consists of very deep, moderately well drained soils on alluvial plains. These soils formed in alluvium derived from extrusive igneous rock. Slope ranges from 0 to 5 percent.

Soils of the Leavers series are coarse-loamy over sandy or sandy-skeletal, mixed, mesic Aridic Haploxerolls.

Typical pedon of Leavers sandy loam, 0 to 2 percent slopes; 800 feet south and 1,200 feet east of the northwest corner of sec. 11, T. 45 N., R. 2 W. (Macdoel Quadrangle):

Ap—0 to 10 inches; gray (10YR 5/1) sandy loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine interstitial pores; about 5 percent pebbles; slightly acid; clear smooth boundary.

A—10 to 15 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine interstitial pores; about 5 percent pebbles; slightly acid; clear wavy boundary.

Bt—15 to 25 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; few thin clay films bridging mineral grains; about 10 percent pebbles; neutral; clear wavy boundary.

2C1—25 to 33 inches; light gray (10YR 7/2) very gravelly loamy sand, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; about 35 percent pebbles; neutral; gradual wavy boundary.

2C2—33 to 60 inches; light brownish gray (10YR 6/2) and light gray (10YR 7/2) very gravelly sand, dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) moist; many medium prominent strong brown (7.5YR 5/6) mottles; massive; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; about 50 percent pebbles; neutral.

These soils are more than 60 inches deep. The thickness of the solum ranges from 20 to 35 inches. Reaction is slightly acid or neutral throughout the profile.

The A horizon has dry color of 10YR 4/2, 5/1, or 5/2 and moist color of 10YR 2/1, 3/1, 3/2, or 3/3. The content of clay ranges from 8 to 13 percent. The content of gravel ranges, by volume, from 0 to 5 percent. The content of organic matter ranges from 1 to 3 percent. This horizon ranges from 12 to 20 inches in thickness.

The Bt horizon has dry color of 10YR 6/2, 6/3, or 7/2 and moist color of 10YR 3/3, 4/2, or 4/3. It has 10 to 15 percent clay. It has 1 or 2 percent more clay than the A horizon. The content of gravel ranges, by volume, from 5 to 10 percent. This horizon ranges from 8 to 15 inches in thickness.

The C horizon has dry color of 10YR 6/2, 6/3, 7/1, 7/2, or 7/3 and moist color of 10YR 4/2, 4/3, or 5/2. The content of gravel ranges from 35 to 60 percent. The content of clay ranges from 0 to 5 percent.

Lequieu Series

The Lequieu series consists of very shallow, well drained soils on plateaus. These soils formed in material weathered from basalt and other kinds of hard, extrusive igneous rock. Slope ranges from 0 to 9 percent.

Soils of the Lequieu series are loamy-skeletal, mixed, nonacid, mesic Lithic Xeric Torriorthents.

Typical pedon of Lequieu very stony loam, in the Lequieu-Adieux complex, 0 to 5 percent slopes; 1,400 feet south and 50 feet west of the northeast corner of sec. 35, T. 48 N., R. 6 E. (Carr Butte Quadrangle); in an area where stones and cobbles cover about 50 percent of the surface:

A—0 to 3 inches; pale brown (10YR 6/3) very stony loam, brown (10YR 4/3) moist; moderate medium granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; many fine vesicular pores; about 17 percent stones, 20 percent cobbles, and 10 percent pebbles; neutral; clear smooth boundary.

C—3 to 8 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine interstitial pores; about 20 percent cobbles and 20 percent pebbles; neutral; abrupt smooth boundary.

R—8 inches; basalt.

About 35 to 55 percent of the surface is covered with stones and cobbles. The soils are 6 to 10 inches deep over basalt and other kinds of hard, extrusive igneous bedrock. The content of clay ranges from 20 to 25 percent in the A and C horizons.

The A horizon has dry color of 10YR 6/2 or 6/3 or 7.5YR 6/2, 6/3, or 6/4 and moist color of 10YR 3/2, 3/3, 4/2, or 4/3 or 7.5YR 4/2. The content of rock fragments ranges from 35 to 55 percent. The content of stones and cobbles ranges from 25 to 40 percent. The content of gravel ranges from 10 to 15 percent.

The C horizon has dry color of 10YR 6/2 or 6/3 or 7.5YR 6/4 and moist color of 10YR 3/4, 4/2, or 4/3 or 7.5YR 4/2 or 4/4. The content of rock fragments ranges from 35 to 55 percent. The content of stones and cobbles ranges from 15 to 25 percent. The content of gravel ranges from 20 to 30 percent.

Lorella Series

The Lorella series consists of shallow, well drained soils on hills. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 5 to 30 percent.

Soils of the Lorella series are clayey-skeletal, montmorillonitic, mesic Lithic Argixerolls.

Typical pedon of Lorella very stony loam, in the Lorella-Fiddler complex, 5 to 30 percent slopes; 1,350 feet north and 1,200 feet west of the southeast corner of sec. 33, T. 48 N., R. 6 E. (Newell Quadrangle); in an area where stones and cobbles cover about 40 percent of the surface:

A1—0 to 3 inches; brown (10YR 5/3) very stony loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; soft, very friable, slightly sticky; common very fine and fine roots; common very fine interstitial and many very fine tubular pores; about 20 percent stones, 10 percent cobbles, and 10 percent pebbles; neutral; clear smooth boundary.

A2—3 to 8 inches; dark grayish brown (10YR 4/2) very stony loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine tubular pores; about 20 percent stones, 10 percent cobbles, and 10 percent pebbles; neutral; clear smooth boundary.

Bt1—8 to 11 inches; dark grayish brown (10YR 4/2) very cobbly clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots; many very fine tubular pores; common thin clay films on faces of peds and lining pores; about 10 percent stones, 20 percent cobbles, and 15 percent pebbles; neutral; clear smooth boundary.

Bt2—11 to 16 inches; dark brown (10YR 4/3) very cobbly clay, very dark grayish brown (10YR 3/2) moist; strong fine subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots; common very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; about 5 percent stones, 25 percent cobbles, and 15 percent pebbles; neutral; abrupt smooth boundary.

R—16 inches; hard, extrusive igneous rock.

The depth to hard, extrusive igneous bedrock ranges from 10 to 20 inches. Reaction is slightly acid or neutral throughout the solum.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 and moist color of 10YR 2/2, 3/2, or 3/3. The content of clay ranges from 12 to 25 percent. The content of organic matter ranges from 2 to 4 percent. The content of rock fragments ranges from 35 to 55 percent. The content of stones and cobbles ranges from

30 to 45 percent. The content of gravel ranges from 5 to 10 percent.

The Bt horizon has dry color of 10YR 4/2, 4/3, or 5/3 and moist color of 10YR 2/2, 3/2, or 3/3. The content of clay ranges from 27 to 50 percent. By weighted average, it is more than 35 percent in the control section. The content of stones, cobbles, and gravel ranges from 40 to 60 percent.

Madeline Series

The Madeline series consists of shallow, well drained soils on mountain side slopes. These soils formed in material weathered from tuff and basalt. Slope ranges from 2 to 15 percent.

Soils of the Madeline series are clayey, montmorillonitic, frigid Lithic Argixerolls.

Typical pedon of Madeline very cobbly loam, in the Madeline-Capona complex, 2 to 15 percent slopes; 1,400 feet east and 1,800 feet south of the northwest corner of sec. 1, T. 46 N., R. 1 E. (Red Rock Lakes Quadrangle); in an area where stones and cobbles cover about 35 percent of the surface:

A—0 to 6 inches; grayish brown (10YR 5/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine and common fine pores; about 10 percent stones, 20 percent cobbles, and 10 percent pebbles; neutral; clear smooth boundary.

Bt1—6 to 13 inches; brown (10YR 5/3) cobbly clay, dark brown (10YR 3/3) moist; strong coarse angular blocky structure; very hard, firm, very sticky and plastic; common very fine and few fine roots; few very fine tubular pores; common thick clay films on faces of peds and lining pores; about 5 percent stones, 15 percent cobbles, and 10 percent pebbles; neutral; clear wavy boundary.

Bt2—13 to 16 inches; brown (7.5YR 4/4) gravelly clay, dark brown (7.5YR 3/4) moist; moderate coarse angular blocky structure; very hard, firm, very sticky and plastic; common very fine roots; few very fine tubular pores; common moderately thick clay films on faces of peds and lining tubular pores; about 5 percent stones, 5 percent cobbles, and 20 percent pebbles; mildly alkaline; abrupt smooth boundary.

R—16 inches; basalt.

The depth to basalt ranges from 10 to 20 inches.

The A horizon has dry color of 10YR 5/2 or 5/3 and moist color of 10YR 3/2 or 3/3. The content of clay ranges from 20 to 27 percent. The content of rock fragments, mostly cobbles and stones, ranges from 35 to 50 percent.

The Bt horizon has dry color of 10YR 5/2, 5/3, or 5/4 or 7.5YR 4/4 or 5/4 and moist color of 10YR 3/2, 3/3, 4/3, or 4/4 or 7.5YR 3/2 or 3/4. The content of clay ranges from 35 to 60 percent. The upper part of this horizon is cobbly or stony clay, and the lower part is gravelly clay or gravelly clay loam.

Mahogan Series

The Mahogan series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 5 to 50 percent.

Soils of the Mahogan series are fine-loamy, mixed, frigid Pachic Argixerolls.

Typical pedon of Mahogan loam, in the Mahogan-Fredonyer complex, 5 to 30 percent slopes; 2,074 feet south and 3,646 feet west of the northeast corner of sec. 28, T. 46 N., R. 1 E. (Red Rock Lakes Quadrangle):

A1—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; strong fine subangular blocky structure; soft, very friable, slightly sticky and plastic; many very fine and fine roots; many very fine interstitial pores; about 5 percent pebbles; neutral; clear smooth boundary.

A2—4 to 13 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; strong fine subangular blocky structure; soft, very friable, slightly sticky and plastic; many very fine and fine roots; many very fine interstitial pores; about 5 percent pebbles; neutral; clear smooth boundary.

BAt1—13 to 19 inches; brown (7.5YR 5/2) gravelly loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine and fine and few coarse roots; common very fine interstitial and tubular pores; common thin clay films on faces of peds; about 15 percent pebbles; neutral; clear wavy boundary.

BAt2—19 to 26 inches; brown (7.5YR 5/2) gravelly loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots; common very fine interstitial and tubular pores; common moderately thick clay films on faces of peds; about 20 percent pebbles and 5 percent cobbles; neutral; clear wavy boundary.

Bt—26 to 38 inches; brown (7.5YR 5/4) gravelly sandy clay loam, dark brown (7.5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine

and fine roots; common very fine interstitial and tubular pores; common moderately thick clay films on faces of peds; about 20 percent pebbles and 5 percent cobbles; neutral; abrupt wavy boundary.

R—38 inches; hard, extrusive igneous rock.

The depth to extrusive igneous bedrock ranges from 30 to 40 inches. The mollic epipedon is 20 to 30 inches thick. The content of organic matter is 1 to 2 percent in the upper 20 to 30 inches.

The A horizon has dry color of 10YR 5/2 or 7.5YR 5/2 and moist color of 10YR 3/2 or 7.5YR 3/2. The content of gravel ranges from 5 to 15 percent. The content of clay ranges from 10 to 15 percent.

The BAt and Bt horizons have dry color of 10YR 5/3 or 6/3 or 7.5YR 5/2, 5/4, or 6/4 and moist color of 10YR 3/3 or 3/4 or 7.5YR 3/2, 3/4, or 4/4. They are gravelly loam or gravelly sandy clay loam and average 18 to 25 percent clay. These horizons have at least 3 percent more clay than the A horizon. The content of rock fragments ranges from 15 to 30 percent. The content of cobbles ranges from 0 to 5 percent. The content of gravel ranges from 15 to 25 percent.

Medford Series

The Medford series consists of very deep, moderately well drained soils on terraces. These soils formed in alluvium derived from extrusive igneous rock. Slope ranges from 0 to 2 percent.

Soils of the Medford series are fine, montmorillonitic, mesic Pachic Argixerolls.

Typical pedon of Medford silty clay loam, 0 to 2 percent slopes; 1,950 feet south and 2,200 feet west of the northeast corner of sec. 34, T. 48 N., R. 2 W. (Sams Neck Quadrangle):

Ap—0 to 6 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; many very fine roots; many very fine interstitial pores; neutral; clear smooth boundary.

Bt1—6 to 10 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure; very hard, very firm, sticky and plastic; many very fine roots; few very fine interstitial and tubular pores; common thin clay films on faces of peds; neutral; clear wavy boundary.

Bt2—10 to 26 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to strong medium angular blocky; very hard, very firm, very sticky and very plastic; common very fine roots; few very fine interstitial and tubular pores; common moderately thick clay films on faces of peds; neutral; clear wavy boundary.

Bt3—26 to 36 inches; brown (10YR 5/3) silty clay, dark brown (10YR 3/3) moist; moderate fine angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; few very fine interstitial and tubular pores; common thin clay films on faces of peds; neutral; gradual wavy boundary.

C1—36 to 52 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, sticky and plastic; common very fine interstitial pores; neutral; gradual wavy boundary.

C2—52 to 62 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, sticky and plastic; common very fine interstitial pores; neutral.

The content of organic matter ranges from 1 to 4 percent in the A horizon. It decreases regularly as depth increases. The mollic epipedon is 20 or more inches thick.

The A horizon has dry color of 10YR 4/2 or 5/2 and moist color of 10YR 2/2 or 3/2. The content of clay ranges from 27 to 35 percent.

The Bt horizon has dry color of 10YR 4/2, 5/2, or 5/3 and moist color of 10YR 2/2, 3/2, or 3/3. The texture is silty clay loam, clay loam, silty clay, or clay. The content of clay ranges from 35 to 45 percent.

Modoc Series

The Modoc series consists of well drained soils on lake terraces. These soils are moderately deep to a duripan. They formed in lacustrine sediment and alluvium derived from extrusive igneous rock. Slope ranges from 0 to 5 percent.

Soils of the Modoc series are fine-loamy, mixed, mesic Aridic Durixerolls.

Typical pedon of Modoc loam, in the Inlow-Ocho-Modoc complex, 0 to 2 percent slopes; 350 feet south and 2,050 feet west of the northeast corner of sec. 14, T. 47 N., R. 1 W. (Dorris Quadrangle):

A1—0 to 3 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine interstitial and tubular pores; neutral; clear smooth boundary.

A2—3 to 12 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure;

slightly hard, friable, slightly sticky and plastic; many very fine and fine and few medium and coarse roots; common very fine interstitial and tubular pores; neutral; clear smooth boundary.

BA—12 to 21 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine and fine and few medium roots; common very fine and fine interstitial and tubular pores; mildly alkaline; clear smooth boundary.

Bt—21 to 34 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; moderate fine and medium angular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; few very fine and fine interstitial and tubular pores; few moderately thick and many thin clay films on faces of peds and lining pores; slightly effervescent; moderately alkaline; abrupt wavy boundary.

Bqm—34 to 42 inches; light gray (10YR 7/2), strongly cemented duripan, brown (10YR 5/3) moist; moderate medium, thick, and very thick platy structure; thin, continuous opal laminar caps on some plates; very hard, very firm; brittle; horizontally oriented and matted roots on the top of the horizon; few very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

Bqkm—42 to 55 inches; light gray (10YR 7/2), strongly cemented duripan, brown (10YR 5/3) moist; strong very thick platy structure; thin opal laminar caps on some plates; extremely hard, very firm; brittle; few very fine tubular pores; strongly effervescent; disseminated lime; accumulations of lime in seams and thin layers of lime coating the top of plates; moderately alkaline; clear wavy boundary.

2C—55 to 60 inches; light gray (10YR 7/2), stratified sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine interstitial pores; moderately alkaline.

Depth to the duripan is 20 to 40 inches. The mollic epipedon ranges from 10 to 14 inches in thickness. The sodium adsorption ratio ranges from 0 to 4. The electrical conductivity ranges from 0 to 2 millimhos per centimeter. Some pedons have a bedrock substratum.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 and moist color of 10YR 2/2, 3/2, or 3/3. Reaction is slightly acid or neutral. This horizon has 15 to 25 percent clay and 0 to 15 percent pebbles.

The Bt horizon has dry color of 10YR 4/3, 4/4, 5/3, 5/4, 6/2, or 6/3, 7.5YR 4/4 or 5/4, or 5YR 4/4 or 5/4 and moist color of 10YR 3/4, 4/2, 4/3, or 4/4, 7.5YR 3/4 or 4/4, or 5YR 4/3 or 4/4. Reaction is neutral to moderately alkaline. This horizon is sandy clay loam or clay loam and averages 25 to 35 percent clay. It has 5 to 15 percent more clay than the A horizon and has 0 to 25 percent pebbles.

The Bqm and Bqkm horizons are indurated or strongly cemented and are massive or platy. The Bqkm horizon is extremely hard or very hard when dry and extremely firm or very firm when moist. It is always brittle. In some pedons the lower part of the duripan is weakly cemented and has as much as 25 percent pebbles. Thin, continuous seams of lime or lime and silica are in some parts the Bqkm horizon. The thickness of the horizons ranges from 5 to 25 inches.

The 2C horizon is stratified sandy loam to gravelly sand.

Mojo Series

The Mojo series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 5 to 30 percent.

Soils of the Mojo series are fine-loamy, mixed, frigid Ultic Argixerolls.

Typical pedon of Mojo stony loam, in the Mojo-Pinehurst complex, 5 to 15 percent slopes; 750 feet south and 375 feet east of the northwest corner of sec. 19, T. 45 N., R. 2 W. (Penoyar Quadrangle):

Oi—2 inches to 0; recently fallen, partially decomposed needles, bark, grass blades, and other organic debris; about 10 percent stones and cobbles.

A1—0 to 3 inches; brown (10YR 4/3) stony loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine interstitial pores; about 6 percent stones, 2 percent cobbles, and 7 percent pebbles; slightly acid; clear smooth boundary.

A2—3 to 9 inches; brown (7.5YR 5/4) stony loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; common very fine interstitial and tubular pores; about 4 percent stones, 5 percent cobbles, and 7 percent pebbles; slightly acid; gradual wavy boundary.

Bt1—9 to 17 inches; brown (7.5YR 5/4) clay loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine, fine, medium, and coarse roots; few very fine interstitial pores; few thin clay films on faces of peds; about 2 percent stones,

5 percent cobbles, and 7 percent pebbles; slightly acid; gradual wavy boundary.

Bt2—17 to 27 inches; light brown (7.5YR 6/4) clay loam, dark brown (7.5YR 3/4) moist; strong medium subangular blocky structure; hard, firm, sticky and plastic; few very fine, fine, medium, and coarse roots; few very fine and fine tubular pores; common thin clay films on faces of peds and lining pores; about 2 percent stones, 5 percent cobbles, and 7 percent pebbles; slightly acid; gradual wavy boundary.

Bt3—27 to 36 inches; reddish yellow (7.5YR 6/6), very gravelly clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine, fine, medium, and coarse roots; few very fine and fine tubular pores; common thin clay films on faces of peds and lining tubular pores; about 10 percent cobbles and 35 percent pebbles; slightly acid; abrupt wavy boundary.

R—36 inches; hard, extrusive igneous rock.

The depth to hard, extrusive igneous bedrock ranges from 30 to 40 inches. Reaction is medium acid or slightly acid throughout the solum. The mollic epipedon is 16 to 19 inches thick. Base saturation (by sum of cations) ranges from 60 to 75 percent.

The A horizon has dry color of 10YR 4/3 or 5/3 or 7.5YR 4/2, 4/4, 5/2, or 5/4 and moist color of 10YR 2/2 or 3/3, 7.5YR 3/2 or 3/3, or 5YR 3/3. It has 20 to 25 percent clay and 15 to 22 percent rock fragments. The content of stones ranges from 3 to 7 percent. The content of cobbles ranges from 2 to 5 percent. The content of gravel ranges from 5 to 10 percent. This horizon is 9 to 10 inches thick.

The Bt1 horizon has dry color of 7.5YR 5/2 or 5/4 and moist color of 7.5YR 3/2 or 5YR 3/3. It averages 27 to 35 percent clay. It has 5 to 15 percent more clay than the A horizon. The content of rock fragments ranges from 7 to 15 percent. The content of cobbles ranges from 2 to 5 percent. The content of stones also ranges from 2 to 5 percent. The content of gravel ranges from 3 to 5 percent.

The Bt2 horizon has dry color of 7.5YR 6/2, 6/4, or 6/6 and moist color of 7.5YR 3/4 or 4/4 or 5YR 3/4. The content of rock fragments ranges from 7 to 15 percent. The content of stones ranges from 2 to 5 percent. The content of cobbles also ranges from 2 to 5 percent. The content of gravel ranges from 3 to 5 percent. The content of clay ranges from 27 to 35 percent.

The Bt3 horizon has 35 to 50 percent rock fragments. The content of cobbles ranges from 10 to 15 percent. The content of gravel ranges from 25 to 35 percent. The content of clay ranges from 27 to 35 percent.

Mudco Series

The Mudco series consists of well drained soils on terraces. These soils are shallow to a duripan. They formed in alluvium derived from tuff and basalt. Slope ranges from 2 to 5 percent.

Soils of the Mudco series are loamy, mixed, mesic, shallow Aridic Durixerolls.

Typical pedon of Mudco gravelly sandy loam, 2 to 5 percent slopes; 1,000 feet north and 2,150 feet west of the southeast corner of sec. 2, T. 45 N., R. 1 E. (Red Rock Lakes Quadrangle):

A1—0 to 3 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many very fine and fine roots; many very fine interstitial and common very fine tubular pores; about 15 percent pebbles; neutral; clear smooth boundary.

A2—3 to 7 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine and fine roots; many very fine interstitial and common very fine tubular pores; about 15 percent pebbles; neutral; clear smooth boundary.

Bt1—7 to 10 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine and fine roots; common very fine interstitial and tubular pores; few thin clay films on faces of peds; about 10 percent pebbles; neutral; clear wavy boundary.

Bt2—10 to 14 inches; brown (7.5YR 5/2) gravelly sandy clay loam, dark brown (7.5YR 4/2) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; common very fine interstitial and tubular pores; common thin clay films on faces of peds and lining interstitial pores; about 15 percent pebbles; neutral; clear wavy boundary.

Bt3—14 to 17 inches; brown (7.5YR 5/4) gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; few very fine interstitial and tubular pores; common moderately thick clay films on faces of peds and lining interstitial pores; about 20 percent pebbles; neutral; abrupt wavy boundary.

Bqm—17 to 60 inches; pink (7.5YR 7/4), indurated

duripan, brown (7.5YR 5/4) moist; massive; extremely hard, extremely firm; brittle; horizontally oriented and matted roots on the top of the horizon; opal laminar cap 1 to 3 millimeters thick; neutral.

Depth to the duripan ranges from 10 to 20 inches.

The A horizon has dry color of 10YR 5/2 or 5/3 or 7.5YR 5/2 or 5/4 and moist color of 10YR 3/2 or 3/3. The content of clay ranges from 5 to 10 percent. The content of gravel ranges from 15 to 25 percent. The content of organic matter is 1 to 2 percent in the upper 5 to 9 inches.

The Bt horizon has dry color of 10YR 5/3 or 5/4 or 7.5YR 5/2 or 5/4 and moist color of 10YR 3/4 or 4/3 or 7.5YR 3/4, 4/2, or 4/4. It is sandy loam or gravelly sandy clay loam. The content of clay ranges from 10 to 25 percent and averages more than 18 percent.

The Bqm horizon has dry color of 10YR 6/2 or 6/3 or 7.5YR 7/2 or 7/4 and moist color of 10YR 4/3 or 4/4 or 7.5YR 5/4. It is massive or has platy structure. It is extremely hard or very hard when dry and extremely firm or very firm when moist. It is always brittle. It has gravel-sized (2 to 5 millimeter) fragments of basalt and tuff. Thin seams of silica are throughout this horizon.

Munnell Series

The Munnell series consists of very deep, well drained soils on alluvial fans. These soils formed in alluvium derived from extrusive igneous rock. Slope ranges from 0 to 5 percent.

Soils of the Munnell series are fine-loamy over sandy or sandy-skeletal, mixed, mesic Aridic Argixerolls.

Typical pedon of Munnell gravelly loam, 0 to 5 percent slopes; 1,150 feet north and 2,250 feet east of the southwest corner of sec. 8, T. 45 N., R. 2 E. (Red Rock Lakes Quadrangle):

A—0 to 5 inches; brown (7.5YR 5/2) gravelly loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine and fine interstitial and tubular pores; about 20 percent pebbles; neutral; clear smooth boundary.

BAt—5 to 10 inches; brown (7.5YR 5/2) gravelly loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine and fine interstitial and tubular pores; few thin clay films bridging mineral grains; about 20 percent pebbles; mildly alkaline; clear wavy boundary.

Bt1—10 to 20 inches; reddish gray (5YR 5/2) gravelly loam, dark reddish gray (5YR 4/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine interstitial and tubular pores; few thin clay films on faces of peds and lining tubular pores; about 20 percent pebbles; mildly alkaline; gradual wavy boundary.

Bt2—20 to 32 inches; reddish brown (5YR 5/3) gravelly loam, reddish brown (5YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine interstitial and tubular pores; few thin clay films bridging mineral grains; about 20 percent pebbles; mildly alkaline; clear wavy boundary.

2C—32 to 60 inches; reddish brown (5YR 5/3) very gravelly sand, reddish brown (5YR 4/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; few very fine interstitial pores; about 50 percent pebbles; mildly alkaline.

Depth to a contrasting texture in the solum ranges from 28 to 39 inches. The mollic epipedon is 10 to 13 inches thick.

The A horizon has dry color of 7.5 4/2 or 5/2 or 10YR 5/2 or 5/3 and moist color of 7.5YR 3/2 or 10YR 3/2 or 3/3. Reaction is slightly acid or neutral. The content of gravel ranges from 15 to 25 percent. The content of clay ranges from 10 to 15 percent.

The BAt and Bt horizons have dry color of 10YR 5/2 or 6/3, 7.5YR 5/2 or 5/3, or 5YR 5/2, 5/3, or 5/4 and moist color of 10YR 3/3, 3/4, 4/2, or 4/3, 7.5YR 3/2, or 5YR 3/2, 3/3, 4/2, or 4/3. Reaction is neutral or mildly alkaline. The Bt horizon is gravelly loam, gravelly sandy clay loam, or sandy clay loam. The average content of clay is 18 to 30 percent. The BAt horizon has at least 3 percent more clay than the A horizon. The content of gravel ranges from 10 to 29 percent.

The 2C horizon has dry color of 10YR 6/2, 6/3, or 7/3 or 5YR 4/3, 5/3, or 5/4 and moist color of 10YR 3/3 or 4/3 or 5YR 3/3, 3/4, or 4/3. It is very gravelly sand or very gravelly loamy sand. The content of clay is 0 to 5 percent. The content of pebbles 2 to 10 millimeters in size ranges from 40 to 60 percent.

Ocho Series

The Ocho series consists of somewhat poorly drained soils on lake terraces. These soils are shallow to a duripan. They formed in lacustrine deposits and alluvium derived from volcanic ash and extrusive igneous rock. Slope ranges from 0 to 2 percent.

Soils of the Ocho series are loamy, mixed, mesic, shallow Haplic Nadurargids.

Typical pedon of Ocho very fine sandy loam, in the Inlow-Ocho complex, 0 to 2 percent slopes; 1,650 feet west and 1,450 feet north of the southeast corner of sec. 9, T. 47 N., R. 1 W. (Dorris Quadrangle):

A—0 to 5 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine interstitial and common fine vesicular pores; moderately alkaline; clear smooth boundary.

E—5 to 9 inches; light gray (10YR 7/1) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine interstitial and few very fine tubular pores; moderately alkaline; clear smooth boundary.

2Btn—9 to 11 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) moist; tongues of light gray (10YR 7/2) material; moderate fine and medium angular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; few very fine interstitial and tubular pores; many moderately thick and thick clay films on faces of peds and lining interstitial pores; strongly effervescent; disseminated lime; strongly alkaline; clear wavy boundary.

2Btkn—11 to 16 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) moist; moderate fine and medium angular blocky structure; hard, firm, sticky and plastic; few very fine roots; few very fine interstitial pores; many moderately thick and thick clay films on faces of peds and lining interstitial pores; violently effervescent; segregated lime; strongly alkaline; abrupt wavy boundary.

2Bqm1—16 to 22 inches; pale brown (10YR 6/3) duripan, dark brown (10YR 3/3) moist; moderate thin and medium platy structure; extremely hard, extremely firm; brittle; few very fine interstitial pores; common moderately thick clay films on faces of peds and lining interstitial pores; violently effervescent; strongly alkaline; clear wavy boundary.

2Bqm2—22 to 34 inches; light gray (10YR 7/2) duripan, brown (7.5YR 4/2) moist; few fine distinct strong brown (7.5YR 5/6) mottles; moderate thin and medium platy structure; extremely hard, extremely firm; brittle; few very fine interstitial pores; common moderately thick clay films on faces of peds and lining interstitial pores; violently effervescent; strongly alkaline; clear wavy boundary.

2Cq1—34 to 40 inches; light gray (10YR 7/2) silt loam, brown (7.5YR 4/2) moist; few fine distinct strong brown (7.5YR 5/6) mottles; weak coarse angular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine interstitial pores; violently effervescent; moderately alkaline; clear wavy boundary.

2Cq2—40 to 49 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine interstitial pores; moderately alkaline; clear wavy boundary.

3Cq3—49 to 55 inches; light brownish gray (10YR 6/2) loamy sand, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine interstitial pores; moderately alkaline; clear wavy boundary.

3Cq4—55 to 60 inches; light gray (10YR 7/2) loamy sand, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine interstitial pores; moderately alkaline.

Depth to the duripan ranges from 14 to 20 inches (fig. 6). The sodium adsorption ratio is more than 35 in the textural control section.

The A horizon has dry color of 10YR 6/1 or 6/2 and moist color of 10YR 3/2, 4/2, or 5/2. Reaction is moderately alkaline or strongly alkaline. The content of clay ranges from 5 to 10 percent. The content of organic matter is 1 to 2 percent.

The E horizon has dry color of 10YR 7/1, 7/2, 8/1, or 8/2 and moist color of 10YR 4/2, 4/3, 5/2, or 5/3. Reaction is moderately alkaline or strongly alkaline. The content of clay ranges from 5 to 10 percent. The content of organic matter averages 0.5 to 1.0 percent.

The 2Btn and 2Btkn horizons have dry color of 10YR 6/2, 6/3, or 6/4 or 7.5YR 6/4 and moist color of 10YR 3/3, 4/2, 4/3, or 4/4 or 7.5YR 4/4. Reaction is strongly alkaline or very strongly alkaline. These horizons are loam or silt loam and average 15 to 25 percent clay. They have at least 5 percent more clay than the A horizon and have less than 15 percent fine sand or coarser sand.

The 2Bqm horizon is very firm or extremely firm when moist and brittle when wet. It ranges from 16 to 20 inches in thickness.

The 2Cq horizon has dry color of 10YR 6/2, 6/3, or 7/2 and moist color of 10YR 3/3, 4/2, or 4/3 or 7.5YR 4/2. The texture is very fine sandy loam, loamy sand, or silt loam. The content of clay ranges from 0 to 5 percent.

Ocho Variant

The Ocho Variant consists of somewhat poorly drained soils on lake terraces. These soils are shallow

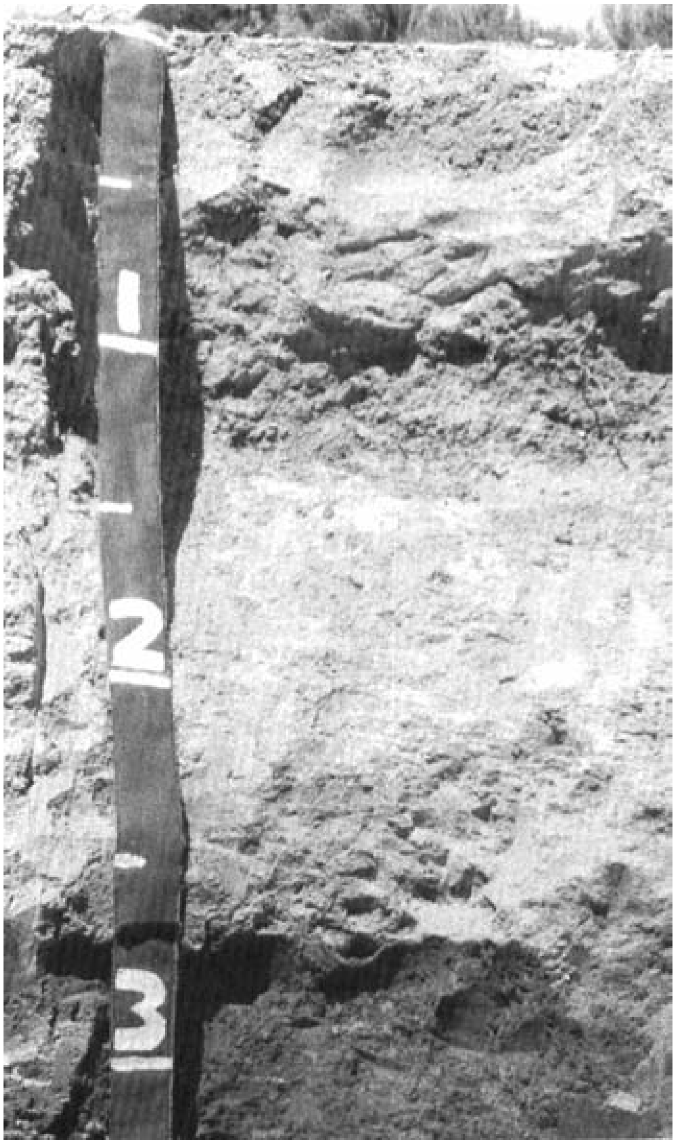

Figure 6.—Typical profile of Ocho very fine sandy loam, in an area of Inlow-Ocho complex, 0 to 2 percent slopes. Depth to a hardpan is 14 to 20 inches in this soil. Depth is marked in feet.

to a duripan. They formed in lacustrine deposits and alluvium derived dominantly from volcanic ash, diatomite, and extrusive igneous rock. Slope ranges from 0 to 2 percent.

Soils of the Ocho Variant are clayey, montmorillonitic, mesic, shallow Haplic Nadurargids.

Typical pedon of Ocho Variant silt loam, 0 to 2 percent slopes; 750 feet south and 1,150 feet west of the northeast corner of sec. 28, T. 47 N., R. 2 W. (Sams Neck Quadrangle):

A—0 to 6 inches; light gray (10YR 7/1) silt loam, dark gray (10YR 4/1) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; many very fine roots; common fine interstitial pores; slightly effervescent; moderately alkaline; clear wavy boundary.

Bt—6 to 19 inches; light gray (10YR 7/2) clay, gray (10YR 5/1) moist; strong coarse prismatic structure; extremely hard, extremely firm, very sticky and very plastic; common very fine roots; few very fine tubular pores; many thick clay films on faces of peds and lining interstitial pores; strongly effervescent; strongly alkaline; abrupt wavy boundary.

Bq1—19 to 25 inches; light brownish gray (10YR 6/2) duripan, dark grayish brown (10YR 4/2) moist; strong medium platy structure; extremely hard, extremely firm; strongly effervescent; strongly alkaline; abrupt wavy boundary.

Bq2—25 to 42 inches; very pale brown (10YR 7/3) duripan, brown (10YR 5/3) moist; moderate thin platy structure; very hard, very firm; strongly effervescent; strongly alkaline; clear wavy boundary.

Bq3—42 to 60 inches; very pale brown (10YR 7/3) duripan, brown (10YR 5/3) moist; moderate thin platy structure; very hard, very firm; slightly effervescent; moderately alkaline.

Depth to the duripan is 14 to 20 inches.

The A horizon has dry color of 10YR 6/2, 6/3, 7/1, or 7/2 and moist color of 10YR 4/1, 4/2, 5/1, or 5/2. The content of clay ranges from 20 to 27 percent. The electrical conductivity ranges from 2 to 4 millimhos per centimeter.

The Bt horizon has dry color of 10YR 6/2, 6/3, 7/1, or 7/2 and moist color of 10YR 4/1, 4/2, 5/1, or 5/2. The content of clay ranges from 40 to 60 percent. The electrical conductivity ranges from 4 to 8 millimhos per centimeter.

Orhood Series

The Orhood series consists of shallow, well drained soils on mountains and hills. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 2 to 50 percent.

Soils of the Orhood series are loamy-skeletal, mixed, mesic Lithic Argixerolls.

Typical pedon of Orhood very cobbly loam, in the Searles-Truax-Orhood complex, 2 to 15 percent slopes; 1,584 feet north and 1,884 feet east of the southwest corner of sec. 30, T. 46 N., R. 2 E. (Red Rock Lakes Quadrangle); in an area where stones and cobbles cover about 20 percent of the surface:

A—0 to 4 inches; grayish brown (10YR 5/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine and fine interstitial pores; about 10 percent stones, 34 percent cobbles, and 6 percent pebbles; neutral; clear smooth boundary.

BAt—4 to 8 inches; grayish brown (10YR 5/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; few very fine and fine interstitial and tubular pores; few thin clay films bridging sand grains; about 10 percent stones, 30 percent cobbles, and 10 percent pebbles; neutral; clear wavy boundary.

Bt1—8 to 11 inches; grayish brown (10YR 5/2) very cobbly clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine and few medium roots; few very fine and fine tubular pores; common moderately thick clay films on faces of peds; about 10 percent stones, 30 percent cobbles, and 10 percent pebbles; neutral; gradual wavy boundary.

Bt2—11 to 14 inches; yellowish brown (10YR 5/4) very cobbly clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; common very fine and fine and few medium roots; few very fine and fine tubular pores; many moderately thick clay films on faces of peds and lining pores; about 10 percent stones, 30 percent cobbles, and 10 percent pebbles; neutral; clear wavy boundary.

BCt—14 to 16 inches; light yellowish brown (10YR 6/4) very cobbly loam, dark yellowish brown (10YR 4/4) moist; moderate medium angular blocky structure; slightly hard, friable, slightly sticky and plastic; common fine roots; common very fine and fine tubular pores; common moderately thick clay films on faces of peds; about 10 percent stones, 30 percent cobbles, and 10 percent pebbles; neutral; abrupt wavy boundary.

R—16 inches; hard, extrusive igneous rock.

The depth to extrusive igneous bedrock ranges from 14 to 20 inches. The content of organic matter ranges from 1 to 3 percent in the upper 10 inches.

The A horizon has dry color of 10YR 5/2 or 5/3 or 7.5YR 5/3 and moist color of 10YR 3/2 or 3/3 or 7.5YR 3/2. It is very cobbly loam, very stony loam, or very stony sandy loam and averages 10 to 15 percent clay. The content of rock fragments ranges from 35 to 60 percent. The content of stones and cobbles ranges from 30 to 45 percent. The content of gravel ranges from 5 to 15 percent.

The Bt horizon has dry color of 10YR 4/3, 5/2, 5/3, 5/4, or 6/4 or 7.5YR 5/2 or 5/4 and moist color of 10YR 3/2, 3/3, 3/4, or 4/4 or 7.5YR 3/2, 3/4, or 4/2. It is very cobbly loam or very cobbly clay loam and has 18 to 32 percent clay. By weighted average, the content of clay ranges from 18 to 27 percent. The content of rock fragments ranges from 35 to 55 percent. The content of stones ranges from 5 to 10 percent. The content of cobbles ranges from 20 to 30 percent. The content of gravel ranges from 10 to 15 percent.

Orset Series

The Orset series consists of very deep, well drained soils on stream terraces. These soils formed in alluvium derived from mixed extrusive igneous rock and volcanic ash. Slope ranges from 0 to 9 percent.

Soils of the Orset series are coarse-loamy, mixed, nonacid, frigid Typic Xerorthents.

Typical pedon of Orset sandy loam, 0 to 9 percent slopes; 800 feet east and 325 feet south of the northwest corner of sec. 33, T. 45 N., R. 2 W. (Penoyar Quadrangle):

Oi—½ inch to 0; undecomposed and partially decomposed needles, bark, grass, and other organic debris.

A—0 to 4 inches; grayish brown (10YR 5/2) sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many medium and common fine roots; many fine interstitial pores; slightly acid; abrupt smooth boundary.

AC—4 to 13 inches; pale brown (10YR 6/3) sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many medium and common fine roots; many fine interstitial pores; medium acid; abrupt smooth boundary.

C1—13 to 26 inches; very pale brown (10YR 7/3) loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; few medium tubular and many fine interstitial pores; medium acid; abrupt smooth boundary.

C2—26 to 42 inches; very pale brown (10YR 7/3) loam, dark brown (10YR 3/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine and common medium roots; few fine tubular and many fine interstitial pores; medium acid; clear smooth boundary.

Cq1—42 to 48 inches; very pale brown (10YR 7/4) loam, dark brown (10YR 3/3) moist; massive; hard,

friable, slightly sticky and slightly plastic; few fine and medium roots; few fine tubular pores; discontinuously and weakly cemented with silica; medium acid; abrupt wavy boundary.

Cq2—48 to 60 inches; very pale brown (10YR 7/4) loam, dark brown (10YR 3/3) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine and medium roots; few fine tubular and many fine interstitial pores; discontinuously and moderately cemented with silica; medium acid.

These soils are 60 or more inches deep. The content of rock fragments ranges from 0 to 15 percent throughout the profile. Most are gravel sized (less than ¾ inch in diameter). The upper 7 inches has dry value of 5.5 and has 0.5 to 1.0 percent organic matter. The soils are medium acid or slightly acid throughout. Base saturation ranges from 50 to 80 percent. It is more than 60 percent in some part of the upper 30 inches.

The A horizon has dry color of 10YR 5/2, 5/3, 6/2, or 6/3 and moist color of 10YR 2/2, 3/2, or 3/3. It has 10 to 18 percent clay.

The AC horizon has dry color of 10YR 6/2, 6/3, 7/2, or 7/3 and moist color of 10YR 3/2, 3/3, 4/2, or 4/3. The texture is sandy loam or loam. This horizon has 10 to 18 percent clay.

The C and Cq horizons have dry color of 10YR 6/2, 6/3, 7/2, 7/3, 7/4, 8/2, or 8/3 or 2.5Y 6/2, 7/2, or 8/2 and moist color of 10YR 3/2, 3/3, 4/2, or 4/3 or 2.5Y 3/2 or 4/2. The texture is sandy loam or loam. These horizons have 10 to 18 percent clay. In most pedons they are only slightly brittle, but in some they are moderately brittle or strongly brittle in some part. They are cemented with silica at a depth of 40 to 60 inches and commonly become more brittle as depth increases. Both the brittleness and the cementation are discontinuous.

Pinehurst Series

The Pinehurst series consists of deep, well drained soils on mountains. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 5 to 30 percent.

Soils of the Pinehurst series are fine-loamy, mixed, frigid Pachic Ultic Argixerolls.

Typical pedon of Pinehurst stony sandy loam, in the Mojo-Pinehurst complex, 5 to 15 percent slopes; 2,160 feet north and 810 feet east of the southwest corner of sec. 19, T. 45 N., R. 2 W. (Penoyar Quadrangle):

Oi—2 inches to 1 inch; pine needles, twigs, and bark.

O2—1 inch to 0; partially decomposed pine needles, twigs, and bark; about 10 percent stones and cobbles.

A1—0 to 5 inches; brown (7.5YR 5/4) stony sandy loam, dark reddish brown (5YR 3/3) moist; moderate fine subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine tubular and interstitial pores; about 10 percent pebbles, 4 percent cobbles, and 6 percent stones; slightly acid; clear smooth boundary.

A2—5 to 15 inches; brown (7.5YR 5/4) gravelly sandy loam, dark reddish brown (5YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine, fine, and medium and few coarse roots; many very fine interstitial and tubular pores; about 1 percent stones, 2 percent cobbles, and 12 percent pebbles; slightly acid; gradual smooth boundary.

Bt1—15 to 29 inches; brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and medium roots; common very fine interstitial and tubular pores; few thin clay films on faces of peds and lining interstitial pores; about 5 percent cobbles and 19 percent pebbles; slightly acid; gradual wavy boundary.

Bt2—29 to 42 inches; light brown (7.5YR 6/4) gravelly loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and medium roots; few very fine tubular and interstitial pores; common moderately thick clay films on faces of peds and lining interstitial pores; about 10 percent cobbles and stones and 19 percent pebbles; slightly acid; gradual wavy boundary.

Bt3—42 to 55 inches; light brown (7.5YR 6/4) very stony loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few fine and medium roots; few very fine tubular and interstitial pores; few moderately thick clay films on faces of peds; about 20 percent stones, 15 percent cobbles, and 5 percent pebbles; slightly acid; abrupt wavy boundary.

R—55 inches; extrusive igneous rock.

The depth to bedrock ranges from 40 to 60 inches. The mollic epipedon is more than 20 inches thick. Base saturation is less than 75 percent in some part of the upper 30 inches. The content of organic matter ranges from 1 to 4 percent in the upper 15 inches. It decreases regularly with increasing depth.

The A horizon has dry color of 10YR 4/2, 5/2, or 5/3 or 7.5YR 4/2, 5/2, or 5/4 and moist color of 10YR 3/2 or 3/3, 7.5YR 2/2 or 3/3, or 5YR 3/2 or 3/3. Reaction is medium acid or slightly acid. This horizon has 15 to 20 percent clay and 15 to 35 percent rock fragments. It is 13 to 16 inches thick.

The Bt1 and Bt2 horizons have dry color of 10YR 5/3 or 5/4, 7.5YR 5/2, 5/4, 6/2, or 6/4, or 5YR 5/4 and moist color of 10YR 3/3 or 3/4, 7.5YR 3/2, 3/4, or 4/4, or 5YR 3/3, 3/4, or 4/4. Reaction is strongly acid to slightly acid. The texture is gravelly loam or gravelly clay loam. These horizons average 20 to 35 percent clay and 15 to 35 percent rock fragments. The Bt3 horizon is very stony clay loam or very stony loam and has 20 to 30 percent clay and 35 to 50 percent rock fragments.

Pit Series

The Pit series consists of very deep, poorly drained soils on flood plains. These soils are artificially drained. They formed in alluvium derived from extrusive igneous rock. Slope ranges from 0 to 2 percent.

Soils of the Pit series are fine, montmorillonitic, mesic Chromic Pelloxererts.

Typical pedon of Pit silty clay, 0 to 2 percent slopes; 2,400 feet north and 150 feet east of the southwest corner of sec. 4, T. 46 N., R. 2 W. (Macdoel Quadrangle):

A1—0 to 4 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; strong medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; many very fine and fine and few medium roots; common very fine interstitial and tubular pores; mildly alkaline; clear smooth boundary.

A2—4 to 26 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; strong coarse prismatic structure; very hard, very firm, very sticky and very plastic; common very fine and fine and few medium roots; few very fine interstitial and tubular pores; thin continuous pressure faces and many intersecting slickensides; mildly alkaline; clear wavy boundary.

AC—26 to 31 inches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/1) moist; weak fine and medium angular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; common very fine interstitial and tubular pores; moderately alkaline; abrupt wavy boundary.

C1—31 to 50 inches; light brownish gray (10YR 6/2) silt loam, very dark grayish brown (10YR 3/2) moist; few medium prominent light yellowish brown (10YR 6/4) mottles; massive; hard, firm, sticky and plastic; few very fine roots; common very fine interstitial and tubular pores; slightly effervescent; seams of lime; moderately alkaline; clear wavy boundary.

C2—50 to 60 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine interstitial pores; slightly effervescent; seams of lime; moderately alkaline.

The thickness of the solum ranges from 20 to 40 inches. Cracks 1 to 4 centimeters wide are at a depth of 20 to 26 inches.

The A horizon has dry color of 10YR 4/1 or 5/1 and moist color of 10YR 2/1 or 3/1. It has 40 to 60 percent clay. Reaction is neutral or mildly alkaline. Common or many intersecting slickensides are in all or part of the A2 horizon.

The C horizon has dry color of 10YR 5/2, 6/2, or 6/3 and moist color of 10YR 3/2, 3/3, 4/2, or 4/3. Reaction is mildly alkaline or moderately alkaline. This horizon has 20 to 27 percent clay.

The Pit soils in this survey area are as shallow as 31 inches to distinct or prominent mottles. This characteristic is outside the range defined for the series. This difference, however, does not significantly affect the use and management of the soils.

Podus Series

The Podus series consists somewhat poorly drained soils on terraces. These soils are shallow to a duripan. They formed in alluvium derived from tuff, basalt, diatomite, and volcanic ash. Slope ranges from 0 to 2 percent.

Soils of the Podus series are sandy, mixed, mesic, shallow Typic Durochrepts.

Typical pedon of Podus loamy fine sand, 0 to 2 percent slopes; 950 feet east and 2,000 feet south of the northwest corner of sec. 21, T. 48 N., R. 5 E. (Tulelake Quadrangle):

Ap—0 to 7 inches; light brownish gray (10YR 6/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; slightly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

A—7 to 12 inches; light brownish gray (10YR 6/2) and light gray (10YR 7/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; slightly effervescent;

disseminated lime; moderately alkaline; clear wavy boundary.

Bw—12 to 18 inches; light gray (10YR 7/2) loamy fine sand, grayish brown (10YR 5/2) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; strongly effervescent; disseminated lime; moderately alkaline; abrupt wavy boundary.

2Cqm—18 to 34 inches; white (10YR 8/2) duripan, yellowish brown (10YR 5/4) moist; massive; extremely hard, very firm; brittle; slightly effervescent; disseminated lime; moderately alkaline; abrupt wavy boundary.

2C—34 to 60 inches; white (10YR 8/2) fine sandy loam, yellowish brown (10YR 5/4) moist; many fine distinct dark yellowish brown mottles; massive; hard, firm, slightly sticky and slightly plastic; few very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline.

Depth to the duripan ranges from 10 to 20 inches.

The A horizon has dry color of 10YR 6/2 or 7/2 and moist color of 10YR 3/2, 3/3, 4/2, or 5/2. The content of clay ranges from 5 to 10 percent.

The B horizon has dry color of 10YR 7/2, 7/3, or 8/2 and moist color of 10YR 4/2, 4/3, 5/2, or 5/4. The content of clay ranges from 5 to 10 percent.

The 2Cqm horizon has dry color of 10YR 7/2, 7/3, 8/2, or 8/3 and moist color of 10YR 4/2, 4/3, 5/3, or 5/4. It is indurated and is massive or has platy structure. It is extremely hard or very hard when dry and extremely firm or very firm when moist. It is always britle.

The 2C horizon has dry color of 10YR 7/3, 8/2, or 8/3 and moist color of 10YR 5/4, 6/2, or 6/3. The content of clay ranges from 5 to 15 percent.

Poe Series

The Poe series consists of somewhat poorly drained soils on terraces. These soils are moderately deep to a duripan. They formed in alluvial and lacustrine sediment weathered from tuff, basalt, diatomite, and volcanic ash. Slope ranges from 0 to 2 percent.

Soils of the Poe series are sandy, mixed, mesic Typic Durochrepts.

Typical pedon of Poe loamy fine sand, 0 to 2 percent slopes; 900 feet north and 1,700 feet west of the southeast corner of sec. 17, T. 48 N., R. 5 E. (Tulelake Quadrangle):

Ap—0 to 12 inches; light brownish gray (10YR 6/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; moderately alkaline; clear wavy boundary.

AC—12 to 17 inches; light gray (10YR 7/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; moderately alkaline; clear wavy boundary.

C1—17 to 24 inches; light gray (10YR 7/2) loamy fine sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; moderately alkaline; clear wavy boundary.

C2—24 to 32 inches; light gray (10YR 7/2) loamy fine sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine interstitial pores; moderately alkaline; abrupt wavy boundary.

2Cqkm1—32 to 46 inches; white (10YR 8/2), indurated duripan, yellowish brown (10YR 5/4) moist; massive; very hard, very firm; brittle; opal laminar cap 1 to 2 millimeters thick on the top of the duripan; moderately alkaline; abrupt smooth boundary.

2Cqkm2—46 to 60 inches; white (10YR 8/2) duripan, yellowish brown (10YR 5/4) moist; massive; hard, very firm; brittle; moderately alkaline.

Depth to the duripan ranges from 20 to 40 inches.

The A horizon has dry color of 10YR 6/2 and moist color of 10YR 3/2, 3/3, 4/2, or 4/3. Reaction is moderately alkaline. The content of clay is 5 to 10 percent.

The C horizon has dry color of 10YR 6/2, 6/3, 7/2, or 7/3 and moist color of 10YR 4/2, 4/3, 5/2, or 5/3. The texture is loamy sand or loamy fine sand. The content of clay is 7 to 10 percent.

Poman Series

The Poman series consists of somewhat excessively drained soils on alluvial plains and terraces. These soils are moderately deep to a duripan. They formed in alluvium derived from extrusive igneous rock. Slope ranges from 0 to 2 percent.

Soils of the Poman series are sandy, mixed, mesic Xerollic Durorthids.

Typical pedon of Poman loamy sand, 0 to 2 percent slopes; 2,100 feet east and 1,200 feet south of the northwest corner of sec. 8, T. 46 N., R. 1 W. (Macdoel Quadrangle):

A1—0 to 2 inches; light brownish gray (10YR 6/2) loamy sand, dark brown (10YR 3/3) moist; single

grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; mildly alkaline; clear smooth boundary.

A2—2 to 10 inches; light brownish gray (10YR 6/2) loamy sand, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; many very fine interstitial and few very fine tubular pores; moderately alkaline; clear smooth boundary.

Bk1—10 to 18 inches; light brownish gray (10YR 6/2) loamy sand, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; many very fine interstitial and common very fine tubular pores; strongly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

Bk2—18 to 29 inches; light brownish gray (10YR 6/2) loamy sand, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial and common very fine tubular pores; strongly effervescent; disseminated lime; moderately alkaline; abrupt wavy boundary.

2Ckqm—29 to 32 inches; pale brown (10YR 6/3) duripan, brown (10YR 4/3) moist; massive; very hard, very firm; brittle; opal laminar cap 1 to 2 millimeters thick on the top of the duripan; violently effervescent; disseminated lime; moderately alkaline; abrupt wavy boundary.

2Ckq—32 to 39 inches; light yellowish brown (10YR 6/4) duripan, dark yellowish brown (10YR 4/4) moist; massive; hard, very firm; brittle; strongly effervescent; disseminated lime; moderately alkaline; abrupt wavy boundary.

3C1—39 to 45 inches; pale brown (10YR 6/3) sand, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; moderately alkaline; clear wavy boundary.

3C2—45 to 60 inches; light brownish gray (10YR 6/2) sand, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; moderately alkaline.

The thickness of the solum and depth to the duripan range from 20 to 40 inches. The duripan ranges from 8 to 12 inches in thickness. It is indurated, has an opal laminar cap, and is cemented with silica and calcium.

The A horizon has dry color of 10YR 6/2 or 6/3 and moist color of 10YR 3/2 or 3/3. Reaction ranges from neutral to moderately alkaline. The content of clay ranges from 0 to 5 percent.

The B horizon has dry color of 10YR 6/2, 6/3, 6/4, or 7/2 and moist color of 10YR 3/3, 4/3, or 4/4. Reaction is mildly alkaline or moderately alkaline. The texture is loamy sand or loamy fine sand. The content of clay ranges from 0 to 5 percent.

The 3C horizon has dry color of 10YR 6/2, 6/3, 6/4, 7/1, 7/2, 7/3, or 7/4 and moist color of 10YR 4/2, 4/3, 5/2, 5/3, or 5/4. Reaction is mildly alkaline or moderately alkaline. The content of clay ranges from 0 to 2 percent.

Porterfield Series

The Porterfield series consists of shallow, well drained soils on the side slopes of plateaus and hills. These soils formed in material weathered from diatomite and tuff. Slope ranges from 5 to 30 percent.

Soils of the Porterfield series are loamy, mixed, nonacid, mesic, shallow Xeric Torriorthents.

Typical pedon of Porterfield loam, in the Hedox-Porterfield complex, 15 to 30 percent slopes; 200 feet south and 200 feet east of the northwest corner of sec. 10, T. 46 N., R. 2 E. (Mt. Dome Quadrangle):

A1—0 to 2 inches; light gray (10YR 7/2) loam, very dark grayish brown (10YR 4/2) moist; moderate very thin and thin platy structure; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine interstitial and tubular and few very fine vesicular pores; about 1 percent stones, 3 percent cobbles, and 1 percent pebbles; neutral; clear smooth boundary.

A2—2 to 6 inches; light gray (10YR 7/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine interstitial and few very fine tubular pores; about 3 percent cobbles, 1 percent pebbles, and 1 percent stones; neutral; clear smooth boundary.

C1—6 to 13 inches; very pale brown (10YR 7/3) loam, brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine interstitial pores; about 3 percent cobbles and 6 percent pebbles; neutral; abrupt smooth boundary.

C2—13 to 15 inches; very pale brown (10YR 7/3) very gravelly loam, brown (10YR 4/3) moist; massive; soft, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine interstitial pores; about 55 percent pebbles; neutral; abrupt smooth boundary.

Cr—15 inches; white (10YR 8/1) diatomite and tuff.

The depth to paralithic contact ranges from 14 to 20 inches. Reaction is neutral to moderately alkaline in the A and C horizons. The content of clay ranges from 18 to 25 percent.

The A horizon has dry color of 10YR 6/2 or 7/2 and moist color of 10YR 3/2, 3/3, or 4/2. The content of rock fragments ranges, by volume, from 5 to 30 percent. The texture is loam or stony loam. The horizon ranges from 3 to 9 inches in thickness.

The C horizon has dry color of 10YR 6/3, 7/2, or 7/3 and moist color of 10YR 4/2 or 4/3. The content of rock fragments ranges from 5 to 15 percent in the upper part of this horizon and from 35 to 60 percent in the lower part. The total content of rock fragments in the control section ranges from 10 to 20 percent, and the total content above the bedrock is less than 35 percent.

Rangee Series

The Rangee series consists of moderately deep, well drained soils on basalt plateaus. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 0 to 5 percent.

Soils of the Rangee series are very fine, montmorillonitic, mesic Abruptic Aridic Durixerolls.

Typical pedon of Rangee sandy clay loam, in the Dunnlake-Rangee complex, 0 to 5 percent slopes; 2,125 feet east and 2,447 feet north of the southwest corner of sec. 3, T. 46 N., R. 2 E. (Mt. Dome Quadrangle):

A1—0 to 2 inches; grayish brown (10YR 5/2) sandy clay loam, very dark brown (10YR 2/2) moist; strong thin and medium platy structure; slightly hard, friable, sticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores; about 8 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

A2—2 to 6 inches; grayish brown (10YR 5/2) sandy clay loam, very dark brown (10YR 2/2) moist; moderate very thick platy structure; slightly hard, very friable, sticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores; about 8 percent cobbles and 5 percent pebbles; neutral; abrupt smooth boundary.

Bt1—6 to 10 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, sticky and plastic; many very fine and fine roots; many very fine interstitial pores; common thin pressure faces on peds; about 1 percent cobbles and 2 percent pebbles; mildly alkaline; clear smooth boundary.

Bt2—10 to 22 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure; hard, friable, sticky and plastic; common very fine and fine roots; common very fine interstitial and tubular pores; many moderately thick pressure faces on peds; about 1 percent cobbles and 2 percent pebbles; mildly alkaline; clear smooth boundary.

Bt3—22 to 24 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; strong medium prismatic structure parting to strong medium angular blocky; very hard, firm, sticky and plastic; common very fine and fine roots; common very fine tubular pores; continuous moderately thick pressure faces on peds; about 1 percent cobbles and 2 percent pebbles; mildly alkaline; abrupt smooth boundary.

Bqm—24 to 30 inches; pink (7.5YR 7/4), very strongly cemented duripan, brown (7.5YR 5/4) moist; black (5YR 2.5/1) manganese coatings; massive; extremely hard, extremely firm; continuous opal laminar coatings; clear wavy boundary.

2R—30 inches; extrusive igneous rock.

Depth to the duripan ranges from 20 to 40 inches. The mollic epipedon is 7 to 15 inches thick. The content of organic matter is 1 to 2 percent in the upper 10 inches.

The A horizon has dry color of 10YR 5/2 or 7.5YR 5/2 and moist color of 10YR 2/2 or 3/2 or 7.5YR 3/2. It has 20 to 27 percent clay and 0 to 13 percent rock fragments. The content of cobbles ranges from 0 to 10 percent. The content of gravel ranges from 0 to 5 percent.

The Bt horizon has dry color of 10YR 5/2 or 5/3 or 7.5YR 5/2 or 5/4 and moist color of 10YR 3/2, 3/3, or 4/3 or 7.5YR 3/2, 4/4, or 5/4. Reaction is neutral or mildly alkaline. By weighted average, the textural control section ranges from 60 to 65 percent clay and 0 to 5 percent rock fragments. The content of cobbles ranges from 0 to 2 percent. The content of gravel ranges from 0 to 3 percent. The content of clay increases by 15 to 20 percent within 2.5 centimeters of the upper boundary of the horizon.

Rangee Variant

The Rangee Variant consists of somewhat poorly drained soils on alluvial fans and terraces. These soils are shallow to a duripan. They formed in alluvium derived from extrusive igneous rock. Slope ranges from 0 to 2 percent.

Soils of the Rangee Variant are clayey, montmorillonitic, mesic, shallow Typic Durixerolls.

Typical pedon of Rangee Variant clay loam, in the Rangee Variant-Dotta complex, 0 to 2 percent slopes (fig. 7); 2,300 feet south and 2,200 feet east of the

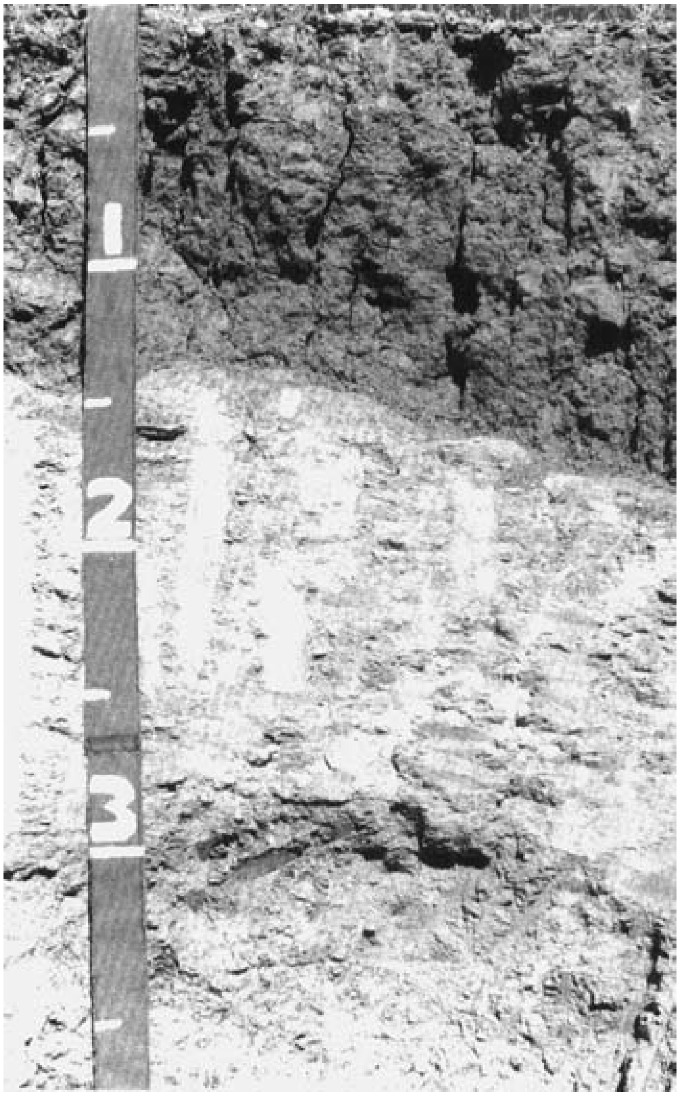

Figure 7.—Typical profile of Rangee Variant clay loam, in an area of Rangee Variant-Dotta complex, 0 to 2 percent slopes. The lower part of the subsoil has prismatic structure. Depth to a hardpan is 12 to 20 inches. Depth is marked in feet.

northwest corner of sec. 4, T. 47 N., R. 2 W. (Sams Neck Quadrangle):

A—0 to 3 inches; gray (10YR 5/1) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure; soft, very friable, sticky and plastic; common very fine roots; many very fine vesicular pores; neutral; clear smooth boundary.

Bt1—3 to 7 inches; gray (10YR 5/1) clay, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; common very fine roots; few very fine tubular and few fine tubular and interstitial pores; common thin clay films on faces of peds; mildly alkaline; abrupt smooth boundary.

Bt2—7 to 16 inches; gray (10YR 6/1) clay, dark brown (10YR 3/3) moist; moderate coarse prismatic structure; extremely hard, extremely firm, very sticky and very plastic; common very fine roots; few fine tubular pores; many thick clay films on faces of peds; moderately alkaline; abrupt smooth boundary.

2Cqkm—16 to 35 inches; very pale brown (10YR 7/3) duripan, brown (10YR 5/3) moist; strong thin platy structure; extremely hard, extremely firm, nonsticky and nonplastic; moderately alkaline; abrupt smooth boundary.

3Cq1—35 to 50 inches; light yellowish brown (10YR 6/4) sandy loam, brown (10YR 4/3) moist; few fine distinct strong brown (7.5YR 5/6) mottles; weak medium platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine interstitial pores; strongly effervescent; moderately alkaline; gradual wavy boundary.

3Cq2—50 to 60 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; few fine distinct strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; hard, firm, nonsticky and nonplastic; common very fine interstitial pores; moderately alkaline.

Depth to the duripan ranges from 12 to 20 inches.

The A horizon has dry color of 10YR 5/1, 5/2, or 5/3 and moist color of 10YR 3/1, 3/2, or 3/3. The content of clay ranges from 30 to 40 percent. Reaction is mildly alkaline or moderately alkaline.

The Bt horizon has dry color of 10YR 5/1, 5/2, or 6/1 and moist color of 10YR 3/2 or 3/3. The content of clay ranges from 40 to 55 percent.

Rojo Series

The Rojo series consists of well drained soils on terraces. These soils are moderately deep to a duripan. They formed in material weathered from tuff and volcanic ash. Slope ranges from 0 to 9 percent.

Soils of the Rojo series are coarse-loamy, mixed, mesic Orthidic Durixerolls.

Typical pedon of Rojo sandy loam, 2 to 9 percent slopes; 2,000 feet north and 1,650 feet east of the southwest corner of sec. 31, T. 46 N., R. 2 E. (Red Rock Lakes Quadrangle):

Ap—0 to 8 inches; brown (7.5YR 5/2) sandy loam, dark reddish brown (5YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial and few very fine tubular

pores; about 5 percent pebbles; neutral; clear smooth boundary.

A—8 to 13 inches; brown (7.5YR 5/2) sandy loam, dark reddish brown (5YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial and few very fine tubular pores; about 5 percent pebbles; neutral; clear wavy boundary.

Bw1—13 to 20 inches; pinkish gray (7.5YR 6/2) sandy loam, reddish brown (5YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine roots; common very fine interstitial and tubular and few fine tubular pores; about 5 percent pebbles; mildly alkaline; gradual wavy boundary.

Bw2—20 to 28 inches; light reddish brown (5YR 6/3) sandy loam, reddish brown (5YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine roots; common very fine interstitial and tubular and few fine tubular pores; about 5 percent pebbles; mildly alkaline; abrupt wavy boundary.

2Bkqm—28 to 30 inches; pink (5YR 7/3), strongly cemented duripan, reddish brown (5YR 5/4) moist; massive; very hard, very firm; brittle; horizontally oriented roots on the top of the duripan; few fine closed tubular pores; slightly effervescent; thin layer of lime 0.5 to 1.0 millimeter thick on the top of the horizon; continuous laminar bands 1 to 2 millimeters thick throughout the horizon; brittle; moderately alkaline; abrupt wavy boundary.

2Cr—30 inches; pink (5YR 7/3), weathered tuff and volcanic ash, reddish brown (5YR 5/4) moist.

The thickness of the solum and depth to the duripan range from 25 to 40 inches. The thickness of the mollic epipedon ranges from 11 to 15 inches. The content of clay ranges from 8 to 15 percent throughout the solum.

The A horizon has dry color of 7.5YR 5/2 or 5YR 5/2 and moist color of 7.5YR 3/2 or 5YR 3/2. The content of gravel ranges from 0 to 10 percent.

The Bw horizon has dry color of 7.5YR 6/2 or 6/4 or 5YR 6/3 or 7/3 and moist color of 7.5YR 5/4 or 5YR 4/3, 5/3, or 5/4. The content of gravel ranges from 0 to 10 percent. Reaction is neutral or mildly alkaline.

Salisbury Series

The Salisbury series consists of well drained soils on terraces. These soils are moderately deep to a duripan. They formed in material weathered from extrusive igneous rock. Slope ranges from 0 to 9 percent.

Soils of the Salisbury series are fine, montmorillonitic, mesic Typic Durixerolls.

Typical pedon of Salisbury cobbly loam, in the Salisbury-Denbar complex, 0 to 9 percent slopes; 200 feet north and 900 feet east of the southwest corner of sec. 3, T. 47 N., R. 6 E. (Newell Quadrangle); in an area where stones and cobbles cover about 10 percent of the surface:

A1—0 to 2 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate very thin and medium platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; few very fine interstitial and tubular pores; about 10 percent pebbles and 10 percent cobbles; neutral; abrupt smooth boundary.

A2—2 to 5 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; many very fine interstitial and common very fine tubular pores; about 10 percent pebbles and 10 percent cobbles; neutral; abrupt smooth boundary.

A3—5 to 9 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots; many very fine interstitial and common very fine tubular pores; about 10 percent pebbles and 15 percent cobbles; neutral; abrupt smooth boundary.

Bt1—9 to 15 inches; brown (10YR 5/3) gravelly clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; many very fine and common fine roots; many very fine interstitial and tubular pores; common thin clay films on faces of peds; about 10 percent pebbles and 5 percent cobbles; mildly alkaline; abrupt wavy boundary.

Bt2—15 to 20 inches; brown (7.5YR 4/4) gravelly clay, dark brown (7.5YR 3/4) moist; strong fine, medium, and coarse prismatic structure; very hard, firm, very sticky and plastic; common very fine roots; few very fine tubular pores; few moderately thick clay films on faces of peds and lining interstitial pores; many continuous pressure faces; about 10 percent pebbles and 5 percent cobbles; moderately alkaline; abrupt wavy boundary.

Bt3—20 to 23 inches; brown (7.5YR 5/4) gravelly clay, dark reddish brown (5YR 3/4) moist; strong fine, medium, and course prismatic structure parting to moderate coarse angular blocky; hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; many thin and few moderately thick clay

films on faces of peds and lining interstitial pores; about 20 percent pebbles and 5 percent cobbles; moderately alkaline; abrupt wavy boundary.

Bqkm1—23 to 29 inches; reddish yellow (7.5YR 6/6) duripan, brown (7.5YR 4/4) moist; massive; strongly cemented, continuous laminar cap of calcium and silica; violently effervescent; clear wavy boundary.

Bqkm2—29 to 49 inches; white (10YR 8/1) and light yellowish brown (10YR 6/4) duripan, very pale brown (10YR 8/3) and dark yellowish brown (10YR 3/4) moist; massive; indurated with silica; laminar cap of calcium; violently effervescent; seams of lime; clear wavy boundary.

Cq—49 to 60 inches; brown (7.5YR 5/4) duripan, dark brown (7.5YR 3/4) moist; massive; weakly cemented with silica; seams of white silica 2 to 5 millimeters thick.

Depth to the duripan ranges from 20 to 40 inches. The content of rock fragments ranges, by volume, from 0 to 35 percent. The content of organic matter is 1 to 2 percent in the upper 10 inches.

The A horizon has dry color of 10YR 4/2 or 5/2. Reaction is neutral or mildly alkaline. The content of clay ranges from 20 to 27 percent.

The Bt horizon has dry color of 10YR 4/2 or 5/3 or 7.5YR 4/3, 4/4, or 5/4 and moist color of 10YR 3/2 or 3/3, 7.5YR 3/4, or 5YR 3/4. Reaction is mildly alkaline or moderately alkaline. The texture is gravelly clay loam or gravelly clay. The content of clay is 35 to 50 percent.

Searles Series

The Searles series consists of moderately deep, well drained soils on mountains and hills. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 2 to 75 percent.

Soils of the Searles series are loamy-skeletal, mixed, mesic Aridic Argixerolls.

Typical pedon of Searles very stony loam, in the Searles-Orhood complex, 30 to 50 percent slopes; 600 feet south and 1,600 feet west of the northeast corner of sec. 12, T. 46 N., R. 1 E. (Red Rock Lakes Quadrangle); in an area where stones and cobbles cover about 25 percent of the surface:

A1—0 to 2 inches; dark grayish brown (10YR 4/2) very stony loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and few fine, medium, and coarse roots; common very fine interstitial and few very fine tubular pores; about 13 percent stones, 10 percent cobbles, and 10 percent pebbles; neutral; clear wavy boundary.

A2—2 to 10 inches; dark grayish brown (10YR 4/2) very stony loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine, medium, and coarse roots; common very fine interstitial and few very fine tubular pores; about 13 percent stones, 10 percent cobbles, and 10 percent pebbles; neutral; clear wavy boundary.

Bt1—10 to 16 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, medium, and coarse roots; common very fine tubular pores; common thin clay films on faces of peds and lining tubular pores; about 10 percent stones, 20 percent cobbles, and 10 percent pebbles; neutral; abrupt wavy boundary.

Bt2—16 to 24 inches; brown (10YR 5/3) very cobbly clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and slightly plastic; few very fine, medium, and coarse roots; common very fine tubular pores; common moderately thick clay films on faces of peds and lining tubular pores; about 10 percent stones, 15 percent cobbles, and 10 percent pebbles; neutral; clear wavy boundary.

BC—24 to 28 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and medium roots; common very fine tubular pores; about 10 percent stones, 15 percent cobbles, and 20 percent pebbles; neutral; abrupt irregular boundary.

R—28 inches; extrusive igneous rock.

The depth to bedrock ranges from 20 to 40 inches. Base saturation is less than 75 percent below a depth of 20 inches. The content of organic matter is 1 to 2 percent in the upper 16 inches and is less than 1 percent at a depth of 20 inches.

The A horizon has dry color of 10YR 4/2, 5/2, or 5/3 and moist color of 10YR 3/2 or 3/3. It has 20 to 27 percent clay and 20 to 45 percent rock fragments. The content of stones and cobbles ranges from 10 to 25 percent. The content of gravel ranges from 10 to 20 percent. This horizon is 10 to 16 inches thick. Reaction ranges from slightly acid to mildly alkaline.

The Bt horizon has dry color of 10YR 4/2, 4/3, 5/3, or 6/3 or 7.5YR 4/4 and moist color of 10YR 3/2 or 3/3 or

7.5YR 3/4. It is very cobbly loam or very cobbly clay loam and averages 25 to 35 percent clay. It has at least 5 percent more clay than the A horizon and has 35 to 60 percent rock fragments. The content of stones and cobbles ranges from 25 to 40 percent. The content of gravel ranges from 10 to 20 percent. Reaction is neutral or mildly alkaline.

The Searles soils in this survey area have as little as 35 percent rock fragments in the Bt horizon. This characteristic is outside the range defined for the series. This difference, however, does not significantly affect the use and management of the soils.

Searles Variant

The Searles Variant series consists of deep, well drained soils on terraces. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 0 to 5 percent.

Soils of the Searles Variant are clayey-skeletal, montmorillonitic, mesic Aridic Argixerolls.

Typical pedon of Searles Variant very stony loam, 0 to 5 percent slopes; 1,000 feet north and 2,600 feet east of the southwest corner of sec. 11, T. 46 N., R. 4 E. (Panhandle Quadrangle); in an area where stones and cobbles cover about 30 percent of the surface:

A—0 to 8 inches; grayish brown (10YR 5/2) very stony loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine, common fine, and few medium roots; common very fine interstitial and tubular pores; about 12 percent stones, 20 percent cobbles, and 20 percent pebbles; neutral; clear smooth boundary.

Bt1—8 to 16 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; common very fine interstitial pores; common thin clay films on faces of peds and lining pores; about 12 percent stones, 20 percent cobbles, and 20 percent pebbles; moderately alkaline; clear smooth boundary.

Bt2—16 to 27 inches; brown (10YR 5/3) very cobbly clay loam, brown (10YR 4/3) moist; strong medium subangular blocky structure; hard, firm, slightly sticky and plastic; few fine and medium roots; few very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; about 12 percent stones, 20 percent cobbles, and 20 percent pebbles; moderately alkaline; clear smooth boundary.

Bt3—27 to 45 inches; brown (10YR 5/3) very cobbly clay, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure; hard, firm, sticky and plastic; few fine and medium roots; few very fine tubular pores; continuous moderately thick clay films on faces of peds and lining pores; about 12 percent stones, 20 percent cobbles, and 20 percent pebbles; moderately alkaline; abrupt wavy boundary.

R—45 inches; hard, extrusive igneous rock.

The depth to extrusive igneous bedrock ranges from 40 to 60 inches. Reaction is neutral to moderately alkaline throughout the solum. The content of rock fragments ranges from 35 to 60 percent. The content of stones and cobbles ranges from 20 to 35 percent. The content of gravel ranges from 15 to 25 percent.

The A horizon has dry color of 10YR 4/2, 5/1, or 5/2 and moist color of 10YR 2/1 or 3/2. It has 18 to 27 percent clay.

The Bt horizon has dry color of 10YR 5/2 or 5/3 and moist color of 10YR 3/2, 3/3, or 4/3. It is very cobbly loam, very cobbly clay, or very cobbly clay loam and averages 20 to 50 percent clay.

Sheld Series

The Sheld series consists of deep, well drained soils on mountains. These soils formed in volcanic ash and in the underlying material weathered from extrusive igneous rock. Slope ranges from 9 to 65 percent.

Soils of the Sheld series are medial-skeletal, frigid Andic Xerumbrepts.

Typical pedon of Sheld stony sandy loam, 9 to 30 percent slopes; 3,800 feet north and 1,800 feet east of the southwest corner of sec. 18, T. 45 N., R. 2 W. (Penoyar Quadrangle):

Oe—2 inches to 0; partially decomposed needles and twigs; about 10 percent stones and cobbles.

A1—0 to 9 inches; dark grayish brown (10YR 4/2) stony sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine, common fine, and few medium roots; common very fine interstitial pores; about 10 percent stones, 5 percent cobbles, and 5 percent pebbles; slightly acid; clear smooth boundary.

A2—9 to 17 inches; brown (7.5YR 5/2) gravelly sandy loam, dark reddish brown (5YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine, common fine, and few medium roots; common very fine interstitial pores; about 5 percent stones,

5 percent cobbles, and 15 percent pebbles; slightly acid; gradual wavy boundary.

BA—17 to 24 inches; pinkish gray (7.5YR 6/2) very stony sandy loam, reddish brown (5YR 4/3) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine, common fine, and few medium roots; common very fine interstitial pores; about 15 percent stones, 2 percent cobbles, and 35 percent pebbles; medium acid; clear wavy boundary.

2Btb1—24 to 36 inches; pinkish gray (7.5YR 6/2) very stony loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common very fine and fine tubular and interstitial pores; few thin clay films bridging mineral grains; about 15 percent stones, 2 percent cobbles, and 35 percent pebbles; medium acid; gradual wavy boundary.

2Btb2—36 to 44 inches; pinkish gray (7.5YR 6/2) very stony loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; common very fine and fine tubular and interstitial pores; common moderately thick clay films bridging mineral grains; about 15 percent stones, 5 percent cobbles, and 35 percent pebbles; medium acid; abrupt wavy boundary.

2Cr—44 inches; weathered, extrusive igneous rock.

About 10 to 15 percent of the surface is covered with stones. The depth to weathered bedrock ranges from 40 to 60 inches. Bulk density ranges from 0.6 to 1.0 gram per cubic centimeter to a depth of 10 to 20 inches. It is 0.85 gram per cubic centimeter at a depth of 10 to 14 inches.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 or 7.5YR 4/4 or 5/2 and moist color of 10YR 2/2, 3/2, or 3/3, 7.5YR 3/2, or 5YR 3/2 or 3/3. Reaction ranges from slightly acid to strongly acid. This horizon has 5 to 10 percent clay and 15 to 35 percent rock fragments. Base saturation ranges from 40 to 60 percent. It is less than 50 percent in at least part of the upper 10 inches. The NaF pH ranges from 9.8 to 10.4.

The 2Bt horizon has dry color of 7.5YR 5/2, 5/4, or 6/2 or 5YR 5/3 or 5/4 and moist color of 7.5YR 3/2 or 4/4 or 5YR 3/2, 3/3, or 3/4. Reaction is slightly acid or medium acid. This horizon is very gravelly sandy loam or very gravelly loam. It has 6 to 12 percent clay and 35 to 60 percent rock fragments. Base saturation ranges from 50 to 60 percent. The NaF pH ranges from 8.5 to 9.0. This horizon is slightly less influenced by amorphous material than is the rest of the profile.

Snell Series

The Snell series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 5 to 30 percent.

Soils of the Snell series are clayey-skeletal, montmorillonitic, frigid Pachic Argixerolls.

Typical pedon of Snell very stony loam, 5 to 30 percent slopes; 900 feet north and 1,200 feet west of the southeast corner of sec. 20, T. 45 N., R. 2 W. (Penoyar Quadrangle); in an area where stones and cobbles cover about 25 percent of the surface:

A1—0 to 2 inches; grayish brown (10YR 5/2) very stony loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine interstitial pores; about 25 percent cobbles and stones and 10 percent pebbles; slightly acid; abrupt smooth boundary.

A2—2 to 4 inches; grayish brown (10YR 5/2) very stony loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, sticky and slightly plastic; many very fine and fine roots; many fine interstitial pores; about 20 percent cobbles and stones and 15 percent pebbles; slightly acid; abrupt smooth boundary.

Bt1—4 to 7 inches; brown (10YR 5/3) very cobbly clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; many very fine and fine roots; many fine interstitial and few fine tubular pores; many clay films bridging mineral grains; about 20 percent cobbles and 15 percent pebbles; slightly acid; clear smooth boundary.

Bt2—7 to 10 inches; brown (10YR 5/3) very cobbly clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, firm, sticky and very plastic; common very fine and fine roots; many fine interstitial and few fine tubular pores; few thin clay films lining interstitial pores and bridging mineral grains; about 20 percent cobbles and 15 percent pebbles; slightly acid; abrupt wavy boundary.

Bt3—10 to 21 inches; brown (10YR 5/3) very cobbly clay, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to strong medium subangular blocky; very hard, firm, very sticky and very plastic; few fine roots; few fine tubular pores;

many moderately thick clay films on faces of peds and lining interstitial pores; about 30 percent cobbles and stones and 25 percent pebbles; slightly acid; abrupt wavy boundary.

R—21 inches; fractured, extrusive igneous rock.

The depth to extrusive igneous bedrock, primarily andesite, ranges from 20 to 40 inches. Reaction is slightly acid or neutral throughout the solum.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 and moist color of 10YR 2/2, 2/3, 3/2, or 3/3. It has 25 to 27 percent clay. The content of rock fragments ranges from 25 to 35 percent.

The Bt horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 or 7.5YR 4/2 or 5/2 and moist color of 10YR 3/2 or 3/3 or 7.5YR 3/2. It averages 35 to 50 percent clay. The content of rock fragments ranges from 35 to 45 percent.

Stukel Series

The Stukel series consists of shallow, well drained soils on hills. These soils formed in material weathered from extrusive igneous rock. Slope ranges from 2 to 30 percent.

Soils of the Stukel series are loamy, mixed, mesic Lithic Haploxerolls.

Typical pedon of Stukel sandy loam, 5 to 30 percent slopes; 2,321 feet south and 850 feet east of the northwest corner of sec. 10, T. 45 N., R. 2 E. (Mt. Dome Quadrangle):

A—0 to 6 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, nonsticky and nonplastic; many very fine and fine and few medium and coarse roots; many very fine interstitial and common vesicular pores; about 5 percent pebbles; neutral; clear smooth boundary.

C1—6 to 15 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine and few medium and coarse roots; common very fine interstitial pores; about 5 percent pebbles; mildly alkaline; clear smooth boundary.

C2—15 to 17 inches; pale brown (10YR 6/3) sandy loam, dark brown (10YR 4/3) moist; massive; soft, nonsticky and nonplastic; many very fine and fine and few medium and coarse roots; common very fine interstitial pores; about 5 percent cobbles and 8 percent pebbles; mildly alkaline; abrupt wavy boundary.

R—17 inches; hard, extrusive igneous rock.

The depth to bedrock is 10 to 20 inches. Reaction is neutral or mildly alkaline in the A and C horizons. The content of clay in these horizons ranges from 10 to 18 percent. The content of gravel ranges from 5 to 15 percent in the A horizon and from 5 to 20 percent in the C horizon. The A horizon has dry color of 10YR 5/2 or 5/3 and moist color of 10YR 3/2 or 3/3.

Teeters Series

The Teeters series consists of very deep, poorly drained soils in lake basins. These soils are artificially drained. They formed in silty sediment derived from volcanic ash, diatomite, and other kinds of extrusive igneous rock. Slope is 0 to 1 percent.

Soils of the Teeters series are medial, calcareous, mesic Mollic Halaquepts.

Typical pedon of Teeters silt loam, 0 to 1 percent slopes; 2,640 feet north and 650 feet east of the southwest corner of sec. 10, T. 46 N., R. 2 W. (Macdoel Quadrangle):

A—0 to 10 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many very fine roots; few very fine tubular pores; slightly effervescent; strongly alkaline; clear smooth boundary.

AC—10 to 13 inches; light brownish gray (10YR 6/2) silt loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, slightly sticky and plastic; few very fine roots; common very fine tubular pores; slightly effervescent; moderately alkaline; clear wavy boundary.

C1—13 to 28 inches; light brownish gray (10YR 6/2) silt, dark grayish brown (10YR 4/2) moist; massive; hard, firm, sticky and plastic; many very fine tubular pores; slightly effervescent; moderately alkaline; clear wavy boundary.

C2—28 to 36 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; massive; slightly hard, friable, slightly sticky and plastic; many very fine tubular pores; moderately alkaline; clear wavy boundary.

C3—36 to 60 inches; light gray (10YR 7/2) silt, grayish brown (10YR 5/2) moist; few fine faint dark grayish brown (2.5Y 4/2) mottles; massive; hard, firm, sticky and plastic; few very fine tubular pores; moderately alkaline.

The depth to bedrock is more than 60 inches. The thickness of the solum ranges from 7 to 24 inches. The estimated bulk density at ⅓ bar water retention is 0.4 to 0.7 gram per cubic centimeter. The exchange complex is dominated by amorphous material. The sodium adsorption ratio ranges from 15 to 45.

The A horizon has dry color of 10YR 4/1 or 5/1 and moist color of 10YR 2/1 or 3/1. The C horizon has dry color of 10YR 5/1, 5/2, 6/1, 6/2, 7/1, or 7/2 and moist color of 10YR 3/1, 4/1, 4/2, 5/1, or 5/2.

Truax Series

The Truax series consists of very deep, well drained soils on alluvial fans. These soils formed in mixed alluvium derived from extrusive igneous rock. Slope ranges from 0 to 15 percent.

Soils of the Truax series are fine-loamy, mixed, mesic Aridic Argixerolls.

Typical pedon of Truax fine sandy loam, in the Searles-Truax-Orhood complex, 2 to 15 percent slopes; 1,810 feet north and 1,900 feet west of the southeast corner of sec. 27, T. 46 N., R. 1 W. (Sheep Mountain Quadrangle); in an area where stones and cobbles cover about 2 percent of the surface:

A—0 to 8 inches; brown (7.5YR 5/2) fine sandy loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common very fine interstitial and tubular pores; about 1 percent stones, 3 percent cobbles, and 2 percent pebbles; slightly acid; clear smooth boundary.

Bt1—8 to 17 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine interstitial and tubular pores; few thin clay films on faces of peds; about 1 percent stones, 3 percent cobbles, and 2 percent pebbles; neutral; clear wavy boundary.

Bt2—17 to 29 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; many very fine interstitial and tubular pores; common thin clay films on faces of peds; about 2 percent stones, 8 percent cobbles, and 2 percent pebbles; neutral; clear wavy boundary.

Bw—29 to 36 inches; yellowish brown (10YR 5/4) sandy loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine, fine, and medium roots; many very fine interstitial and tubular pores; about 2 percent stones, 8 percent cobbles, and 2 percent pebbles; mildly alkaline; clear wavy boundary.

Bq1—36 to 43 inches; yellowish brown (10YR 5/4) sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, firm, nonsticky and nonplastic; weakly cemented when dry and nonbrittle when wet; few very fine roots; many very fine interstitial pores; about 2 percent stones, 8 percent cobbles, and 2 percent pebbles; mildly alkaline; abrupt wavy boundary.

Bq2—43 to 60 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 3/4) moist; massive; hard, firm, nonsticky and nonplastic; weakly cemented when dry and nonbrittle when wet; common very fine and few fine and medium roots; common very fine tubular and interstitial pores; discontinuous laminar cap 0.5 to 2.0 millimeters thick; about 2 percent stones, 8 percent cobbles, and 2 percent pebbles; weakly cemented dry and nonbrittle wet; mildly alkaline.

The thickness of the solum ranges from 25 to 32 inches. The content of rock fragments ranges, by volume, from 0 to 15 percent throughout the profile. The content of stones ranges from 0 to 2 percent. The content of cobbles ranges from 0 to 8 percent. The content of gravel ranges from 0 to 5 percent. The mollic epipedon is 14 to 19 inches thick.

The A horizon has dry color of 10YR 5/2 or 5/3 or 7.5YR 5/2 and moist color of 10YR 3/2 or 7.5YR 3/2. The content of clay ranges from 10 to 15 percent. Reaction is slightly acid or neutral.

The Bt1 horizon has dry color of 10YR 5/2 or 5/3 or 7.5YR 5/4 and moist color of 10YR 3/3 or 7.5YR 3/2. It is sandy clay loam or loam and averages 20 to 25 percent clay. It has at least 4 percent more clay than the A horizon. Reaction is slightly acid or neutral.

The Bt2 horizon has dry color of 10YR 5/4 or 7.5YR 5/2 or 5/4 and moist color of 7.5YR 3/4 or 4/4. It is sandy clay loam or loam and averages 20 to 25 percent clay. Reaction is slightly acid or neutral.

The Bq horizon has dry color of 10YR 5/3, 5/4, or 6/4 or 7.5YR 5/4, 6/2, or 6/4 and moist color of 10YR 5/4 or 7.5YR 3/4, 4/4, 4/6, or 5/4. Reaction is neutral or mildly alkaline. The content of clay is 10 to 15 percent.

Tulana Series

The Tulana series consists of very deep, poorly drained soils in lake basins. These soils are artificially drained. They formed in stratified lacustrine sediment derived from diatomite and volcanic ash. Slope is 0 to 1 percent.

Soils of the Tulana series are medial, nonacid, mesic Mollic Andaquepts.

Typical pedon of Tulana silt loam, 0 to 1 percent

slopes; 10 feet south and 1,200 feet east of the northwest corner of sec. 21, T. 48 N., R. 2 E. (Sheepy Lake Quadrangle):

Ap—0 to 6 inches; grayish brown (10YR 5/2) silt loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine and few fine roots; common very fine interstitial and few very fine tubular pores; mildly alkaline; clear smooth boundary.

A—6 to 12 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine interstitial and few very fine tubular pores; mildly alkaline; abrupt irregular boundary.

C1—12 to 16 inches; light gray (10YR 7/1) silt loam, gray (10YR 5/1) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; common very fine roots; many very fine interstitial and few very fine tubular pores; neutral; abrupt irregular boundary.

C2—16 to 23 inches; grayish brown (10YR 5/2) silt, very dark grayish brown (10YR 3/2) moist; many medium prominent yellowish red (5YR 4/6) mottles; massive; hard, friable, nonsticky and nonplastic; many very fine and common fine roots; many very fine interstitial and few very fine tubular pores; neutral; abrupt smooth boundary.

C3—23 to 41 inches; very pale brown (10YR 7/3) silt, brown (10YR 5/3) moist; common medium prominent yellowish red (5YR 5/6) mottles; massive; hard, friable, nonsticky and nonplastic; few very fine and fine roots; neutral; clear wavy boundary.

2C—41 to 60 inches; light yellowish brown (2.5Y 6/4), stratified fine sand, loamy sand, silt, and silt loam, light olive brown (2.5Y 5/4) moist; common medium prominent yellowish brown (10YR 5/8) and many medium distinct dark grayish brown (2.5Y 4/2) mottles; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; neutral.

The solum is 7 to 20 inches thick. Reaction is neutral or mildly alkaline throughout the profile. The layers of silt loam and silt in the C horizon commonly have cracks 1 to 10 millimeters wide when the soils are dry. Bulk density at ⅓ bar water retention ranges from about 0.4 to 0.7 gram per cubic centimeter. The exchange complex is dominated by amorphous material. The soils have a large amount of diatomite.

The A horizon has dry color of 10YR 4/1, 5/1, or 5/2 and moist color of 10YR 2/1, 3/1, or 3/2. It is neutral or mildly alkaline. The C horizon has dry color of 10YR 5/1, 5/2, 6/1, 6/2, 7/1, 7/2, or 7/3 and moist color of 10YR 3/2, 4/1, 4/2, 5/1, 5/2, or 5/3

Tulana Variant

The Tulana Variant consists of very deep, very poorly drained soils in lake basins. These soils formed in organic material underlain by lacustrine sediment derived from diatomite and volcanic ash. Slope is 0 to 1 percent.

Soils of the Tulana Variant are diatomaceous, euic, mesic Limnic Medifibrists.

Typical pedon of Tulana Variant mucky peat, 0 to 1 percent slopes; 1,280 feet south and 1,800 feet west of the northeast corner of sec. 32, T. 48 N., R. 2 E. (Sheepy Lake Quadrangle):

Oi1—0 to 5 inches; dark gray (10YR 4/1) mucky peat, black (N 2/0) moist; about 92 percent fibers, 80 percent rubbed; weak thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots; many very fine interstitial pores; neutral; clear smooth boundary.

Oi2—5 to 18 inches; grayish brown (10YR 5/2) mucky peat, black (10YR 2/1) moist; about 94 percent fibers, 92 percent rubbed; strong thin platy structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine interstitial and few very fine tubular pores; neutral; clear smooth boundary.

Oi3—18 to 22 inches; black (10YR 2/1) mucky peat, black (N 2/0) moist; about 100 percent fibers rubbed; strong thin platy structure; very hard, friable, nonsticky and nonplastic; few very fine roots; strongly acid; abrupt smooth boundary.

2A—22 to 38 inches; gray (10YR 5/1) silt, very dark gray (10YR 3/1) moist; strong thin platy structure; hard, friable, nonsticky and nonplastic; slightly acid; abrupt smooth boundary.

2C1—38 to 55 inches; white (2.5Y 8/2) silt, light olive brown (2.5Y 5/4) moist; many medium prominent dark reddish brown (5YR 3/3) and olive gray (5Y 4/2) mottles; massive; hard, firm, nonsticky and nonplastic; very strongly acid; clear smooth boundary.

2C2—55 to 60 inches; white (2.5Y 8/2) silt, dark greenish gray (5G 4/1) moist; massive; hard, firm, nonsticky and nonplastic; moderately alkaline.

The fibric surface tier ranges from 16 to 24 inches in thickness. It is neutral to strongly acid. The fibers are

derived mainly from sedges, rushes, and grasses.

The surface tier has moist color of N 2/0 or 10YR 2/1 or 2/2. The C horizon has moist color of 2.5Y 4/2 or 5/4 or 5G 4/1. It is very strongly acid to moderately alkaline.

Tulebasin Series

The Tulebasin series consists of very deep, very poorly drained soils in lake basins. These soils are artificially drained. They formed in lacustrine sediment derived from diatomite and volcanic ash. Slope is 0 to 1 percent.

Soils of the Tulebasin series are fine, mixed, mesic Andaqueptic Haplaquolls.

Typical pedon of Tulebasin mucky silty clay loam, 0 to 1 percent slopes; 1,400 feet north and 500 feet west of the southeast corner of sec. 35, T. 48 N., R. 4 E. (Tulelake Quadrangle):

Ap—0 to 14 inches; gray (10YR 5/1) mucky silty clay loam, very dark gray (10YR 3/1) moist; moderate medium angular blocky structure; hard, friable, sticky and plastic; many very fine roots; common very fine interstitial and tubular pores; mildly alkaline; abrupt smooth boundary.

AC—14 to 22 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium angular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots; common very fine interstitial and tubular pores; moderately alkaline; abrupt smooth boundary.

C1—22 to 32 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; few fine distinct yellowish brown (10YR 5/6) mottles; moderate thin platy structure; very hard, very firm, very sticky and very plastic; common very fine roots; few very fine interstitial pores; moderately alkaline; clear smooth boundary.

C2—32 to 45 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; hard, firm, sticky and plastic; common very fine roots; few very fine interstitial pores; moderately alkaline; clear smooth boundary.

C3—45 to 50 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium angular blocky structure; hard, firm, sticky and plastic; few very fine roots; few very fine interstitial pores; moderately alkaline; clear smooth boundary.

C4—50 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; few very fine interstitial pores; moderately alkaline.

Bulk density at ⅓ bar water retention is 0.85 to 0.95 gram per cubic centimeter in the upper 75 centimeters. The ratio of measured clay to 15-bar water content ranges from 0.5 to 1.2. The sodium adsorption ratio ranges from 0 to 8. The exchange complex is influenced by amorphous material, and the soils have a high content of diatomite. By weighted average, the content of clay in the 10- to 40-inch textural control section is 35 to 50 percent. The thickness of the mollic epipedon ranges from 14 to 32 inches.

The A horizon has dry color of 10YR 4/1, 5/1, or 5/2 and moist color of 10YR 2/1, 3/1, or 3/2. Reaction ranges from neutral to moderately alkaline. The content of clay ranges from 30 to 40 percent. The electrical conductivity ranges from 0 to 2 millimhos per centimeter. The content of organic matter ranges from 10 to 15 percent.

The C horizon has dry color of 2.5Y 5/1, 5/2, 6/2, 7/2, or 8/2 and moist color of 2.5Y 3/2, 4/2, 4/4, or 5/2. The upper part of this horizon is silty clay and has 40 to 50 percent clay, and the lower part is silty clay loam or silty clay and has 30 to 50 percent clay. The electrical conductivity ranges from 2 to 8 millimhos per centimeter throughout the horizon. Reaction is mildly alkaline or moderately alkaline.

Zanbur Series

The Zanbur series consists of very deep, moderately well drained soils in basins on terraces. These soils formed in alluvium derived dominantly from tuff and volcanic ash and are underlain by lacustrine sediment. Slope ranges from 0 to 2 percent.

Soils of the Zanbur series are sandy over loamy, mixed, mesic Entic Haploxerolls.

Typical pedon of the Zanbur sandy loam, 0 to 2 percent slopes; 1,700 feet west and 775 feet north of the southeast corner of sec. 27, T. 48 N., R. 5 E. (Tulelake Quadrangle):

Ap—0 to 10 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine interstitial and tubular pores; slightly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

AC—10 to 13 inches; light brownish gray (10YR 6/2)

loamy fine sand, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine interstitial and few very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline; abrupt smooth boundary.

C—13 to 20 inches; light brownish gray (10YR 6/2) and light gray (10YR 7/2) loamy sand, very dark grayish brown (10YR 3/2) moist; massive; loose, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial and tubular pores; slightly effervescent; disseminated lime; moderately alkaline; abrupt wavy boundary.

2C1—20 to 30 inches; white (2.5Y 8/2) silt loam, light yellowish brown (2.5Y 6/4) moist; weak thin platy structure; slightly hard, friable, slightly sticky and plastic; few very fine roots; few very fine interstitial and tubular pores; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

2C2—30 to 60 inches; white (2.5Y 8/2) silt loam, light yellowish brown (2.5Y 6/4) moist; moderate thin platy structure; hard, firm, slightly sticky and plastic; few very fine roots; common very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

Reaction is mildly alkaline or moderately alkaline throughout the profile.

The A horizon has dry color of 10YR 4/2, 5/2, or 5/3 and moist color of 10YR 3/1, 3/2, or 3/3. It has 10 to 18 percent clay. The content of gravel ranges from 0 to 15 percent.

The C horizon has dry color of 10YR 6/1, 6/2, 6/3, or 7/2 and moist color of 3/2, 4/2, 4/3, or 4/4. The texture is loamy fine sand or loamy sand. The content of clay is 0 to 10 percent. The content of gravel ranges from 0 to 15 percent.

The 2C horizon has dry color of 10YR 6/2, 6/3, 7/2, 7/3, 8/2, or 8/3 or 2.5Y 7/2, 7/4, 8/2, or 8/4 and moist color of 10YR 5/2, 5/3, 6/2, or 6/3 or 2.5Y 5/2, 5/4, 6/2, or 6/4. It has 10 to 18 percent clay. The electrical conductivity ranges from 2 to 8 millimhos per centimeter.

Zuman Series

The Zuman series consists of very deep, poorly drained soils in lake basins. These soils are artificially drained. They formed in lacustrine sediment derived from diatomite and extrusive igneous rock. Slope is 0 to 1 percent.

Soils of the Zuman series are fine-loamy over sandy or sandy-skeletal, mixed (calcareous), mesic Typic Halaquepts.

Typical pedon of Zuman silt loam, ponded, 0 to 1 percent slopes; 400 feet north and 400 feet east of the southwest corner of sec. 15, T. 48 N., R. 1 E. (Sheepy Lake Quadrangle):

A—0 to 4 inches; gray (10YR 6/1) silt loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; few fine interstitial and tubular pores; violently effervescent; disseminated lime; strongly alkaline; clear smooth boundary.

C—4 to 14 inches; gray (10YR 6/1) sandy clay loam, grayish brown (10YR 5/2) moist; massive; hard, firm, sticky and plastic; few very fine and fine roots; few fine tubular and interstitial pores; violently effervescent; disseminated lime; strongly alkaline; abrupt smooth boundary.

2C1—14 to 25 inches; gray (10YR 5/1) fine sand, very dark gray (10YR 3/1) moist; massive; soft, loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; strongly effervescent; disseminated lime; strongly alkaline; clear wavy boundary.

2C2—25 to 60 inches; dark gray (N 4/0) fine sand, black (10YR 2/1) moist; massive; hard, firm, nonsticky and nonplastic; many very fine interstitial pores; slightly effervescent; disseminated lime; strongly alkaline.

Reaction is moderately alkaline or strongly alkaline throughout the profile. The sodium adsorption ratio exceeds 15 in all or part of the upper 20 inches and varies below a depth of 20 inches. The A horizon has moist color of 10YR 4/2 or 5/2. It is loamy fine sand or silt loam. It is 4 to 8 inches thick.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 2.5
Low	2.5 to 5.0
Moderate	5.0 to 7.5
High	7.5 to 10.0
Very high	more than 10.0

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte. An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of a standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Choker. A noose or wire rope by which a log is pulled or lifted during yarding.

Cirque. A semicircular, concave, bowllike area that has steep faces primarily resulting from glacial ice and snow abrasion.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The plant community on a given site that will be established if present environmental conditions continue to prevail and the site is properly managed.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.

Codominant trees. Well developed trees that reach into the main canopy but are subject to some side pressure from neighboring trees. Their growth rate is good but is somewhat less than that of the dominant trees.

Colluvium. Soil material, rock fragments, or both,

moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Congeliturbate. Soil material disturbed by frost action.

Conglomerate. A coarse grained, clastic rock composed of rounded to subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cuesta. An asymmetric, homoclinal ridge capped by resistant rock layers of slight or moderate dip.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Dominant trees. The largest, tallest, and most vigorous trees in the stand. The crown is dense and is comparatively wide and long. The growth rate is the fastest in the stand.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.

Well drained.—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except for rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley, generally more open and with broader bottom land than a ravine or gulch.

Duff. A term used to identify a generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion hazard. The risk of water erosion in an area where the soil is not protected by a plant cover.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Extrusive igneous rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface. Common types of igneous rock are basalt and andesite.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (or 300 meters) and fringes a mountain range or high-plateau escarpment.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is more than 15 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples of suitable plants are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Indicator species. The tree species that is common in the area and generally is the most productive on the soil. It is the species that determines the ordination class.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landing. An area where forest products are concentrated before they are transported to market.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand or loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides and a surface of considerably bare rock. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Post and piling outlet. A market location where posts and pilings are bought, processed, and sold.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content

of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium. Salinity is expressed as the electrical conductivity of a saturation extract, in millimhos per centimeter at 25 degrees C. Classes of salinity are *very slightly saline*, 0 to 4 millimhos per centimeter; *slightly saline*, 4 to 8 millimhos per centimeter; *moderately saline*, 8 to 16 millimhos per centimeter; and *strongly saline*, more than 16 millimhos per centimeter.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site class. A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

Site curve (50-year). A set of related curves on a graph that shows the average height of dominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that shows the average height of dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant and codominant trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 2 percent
Gently sloping	2 to 5 percent
Moderately sloping	5 to 9 percent
Strongly sloping	9 to 15 percent
Moderately steep	15 to 30 percent
Steep	30 to 50 percent
Very steep	50 to 75 percent
Extremely steep	more than 75 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to Ca^{++}+ Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soft bedrock. Bedrock that can be excavated with

trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the substratum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 6 to 15 inches (15 to 38 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Tailwater. The water just downstream of a structure.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand,

loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Tractor yarding. A system of skidding logs through the use of a self-propelled vehicle. Generally, the logs are dragged with a grapple or with chokers.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Yarding. The movement of forest products from the point where the tree is felled to a landing.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-81 at Mount Hebron and Tulelake, California)

Month	Temperature: Average daily maximum	Temperature: Average daily minimum	Temperature: Average	Temperature: 2 years in 10 will have-- Maximum temperature higher than--	Temperature: 2 years in 10 will have-- Minimum temperature lower than--	Temperature: Average number of growing degree days*	Precipitation: Average	Precipitation: 2 years in 10 will have-- Less than--	Precipitation: 2 years in 10 will have-- More than--	Precipitation: Average number of days with 0.10 inch or more	Precipitation: Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
MOUNT HEBRON:											
January	39.8	15.9	27.9	57	-15	16	1.41	0.67	2.05	4	6.3
February	45.7	20.2	33.0	62	-2	27	1.18	.34	1.84	3	3.5
March	49.3	22.7	36.0	70	5	41	1.05	.31	1.64	4	7.3
April	56.8	25.3	41.1	78	10	111	.84	.24	1.32	3	1.6
May	64.8	32.1	48.5	87	17	274	.99	.28	1.56	3	.5
June	73.1	38.6	55.9	92	25	477	.96	.24	1.53	3	.0
July	83.3	42.3	62.8	97	29	707	.35	.01	.60	1	.0
August	81.5	40.4	61.0	96	27	651	.51	---	.87	2	.0
September	75.7	34.1	54.9	91	19	447	.54	.08	.89	1	.0
October	64.5	27.1	45.8	86	12	197	.99	.17	1.62	3	.1
November	50.2	21.4	35.8	69	-1	37	1.80	.51	2.85	4	4.0
December	41.1	15.9	28.5	58	-9	20	2.02	.67	3.11	5	5.8
Yearly:											
Average	60.5	28.0	44.3	---	---	---	---	---	---	---	---
Extreme	---	---	---	98	-18	---	---	---	---	---	---
Total	---	---	---	---	---	3,005	12.64	10.11	14.98	36	29.1
TULELAKE:											
January	40.3	19.4	29.9	57	-8	42	1.16	.55	1.68	5	4.8
February	46.7	23.2	35.0	64	1	50	1.06	.41	1.61	4	3.2
March	51.4	24.7	38.1	70	8	61	1.02	.44	1.50	4	4.6
April	59.4	28.1	43.8	80	14	163	.71	.21	1.10	3	.9
May	68.6	35.3	52.0	88	20	378	1.04	.31	1.62	4	.1
June	76.7	41.4	59.1	93	28	573	.92	.12	1.55	3	.0
July	85.5	45.0	65.3	96	33	784	.24	---	.41	1	.0
August	83.7	42.6	63.2	97	30	719	.52	.01	.87	1	.0
September	78.3	36.7	57.5	93	22	525	.44	.07	.71	2	.0
October	66.3	29.6	48.0	86	15	258	.98	.20	1.58	3	.0
November	50.7	24.5	37.6	70	3	37	1.33	.42	2.08	5	1.5
December	41.6	20.1	30.9	58	-6	28	1.57	.61	2.36	6	4.4
Yearly:											
Average	62.4	30.9	46.7	---	---	---	---	---	---	---	---
Extreme	---	---	---	98	-13	---	---	---	---	---	---
Total	---	---	---	---	---	3,618	10.99	8.66	13.17	41	19.5

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-81 at Mount Hebron and Tulelake, California)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
MOUNT HEBRON:			
Last freezing temperature in spring:			
1 year in 10 later than--	June 5	June 28	July 4
2 years in 10 later than--	May 31	June 22	July 1
5 years in 10 later than--	May 20	June 11	June 26
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 6	Aug. 3	June 22
2 years in 10 earlier than--	Sept. 13	Aug. 14	July 2
5 years in 10 earlier than--	Sept. 25	Sept. 4	July 22
TULELAKE:			
Last freezing temperature in spring:			
1 year in 10 later than--	May 26	June 12	July 2
2 years in 10 later than--	May 19	June 6	June 27
5 years in 10 later than--	May 7	May 25	June 17
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 13	Sept. 1	July 19
2 years in 10 earlier than--	Sept. 19	Sept. 8	Aug. 1
5 years in 10 earlier than--	Oct. 2	Sept. 20	Aug. 24

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-81 at Mount Hebron and Tulelake, California)

Probability	Daily minimum temperature during growing season		
	Higher than 24 ^{o}F	Higher than 28 ^{o}F	Higher than 32 ^{o}F
	Days	Days	Days
MOUNT HEBRON:			
9 years in 10	104	45	0
8 years in 10	112	59	4
5 years in 10	127	85	25
2 years in 10	143	110	47
1 year in 10	151	124	58
TULELAKE:			
9 years in 10	115	90	26
8 years in 10	126	100	40
5 years in 10	147	117	67
2 years in 10	169	135	95
1 year in 10	180	144	109

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Siskiyou County	Modoc County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Pct
101	Avis stony sandy loam, 5 to 30 percent slopes	290	0	290	0.1
102	Capjac silt loam, 0 to 1 percent slopes	42,530	1,170	43,700	9.9
103	Capjac silt loam, ponded, 0 to 1 percent slopes	4,240	0	4,240	1.0
104	Capona cobbly loam, 5 to 30 percent slopes	1,380	1,310	2,690	0.6
105	Capona-Rock outcrop complex, 0 to 5 percent slopes	1,620	2,270	3,890	0.9
106	Dehill fine sandy loam, 0 to 5 percent slopes	4,530	1,820	6,350	1.5
107	Dehill fine sandy loam, 5 to 15 percent slopes	1,530	150	1,680	0.4
108	Demox stony sandy loam, 2 to 15 percent slopes	920	150	1,070	0.2
109	Demox-Rubble land complex, 15 to 50 percent slopes	1,900	1,870	3,770	0.9
110	Doel sandy loam, 0 to 2 percent slopes	6,960	0	6,960	1.6
111	Dotta sandy loam, 0 to 5 percent slopes	2,310	2,320	4,630	1.1
112	Dunnlake-Bucklake complex, 2 to 15 percent slopes	470	4,890	5,360	1.2
113	Dunnlake-Bucklake complex, 15 to 30 percent slopes	1,740	440	2,180	0.5
114	Dunnlake-Bucklake-Lequieu complex, 2 to 9 percent slopes	2,710	0	2,710	0.6
115	Dunnlake-Lequieu complex, 2 to 9 percent slopes	4,320	30	4,350	1.0
116	Dunnlake-Rangee complex, 0 to 5 percent slopes	5,530	0	5,530	1.3
117	Eastable loam, 0 to 5 percent slopes	6,140	110	6,250	1.4
118	Eastable-Hedox complex, 2 to 9 percent slopes	2,000	0	2,000	0.5
119	Esro loam, 0 to 2 percent slopes	260	0	260	0.1
120	Esro loam, drained, 0 to 2 percent slopes	140	0	140	*
121	Forbar fine sand, 0 to 2 percent slopes	1,260	0	1,260	0.3
122	Fordney loamy fine sand, 0 to 2 percent slopes	5,870	1,890	7,760	1.8
123	Fordney loamy fine sand, 5 to 15 percent slopes	620	640	1,260	0.3
124	Fordney loamy fine sand, slightly wet, 0 to 2 percent slopes	3,210	560	3,770	0.9
125	Fredonyer-Mahogan complex, 30 to 50 percent slopes	3,450	0	3,450	0.8
126	Fredonyer-Rock outcrop complex, 30 to 50 percent slopes	860	0	860	0.2
127	Hedox-Porterfield complex, 5 to 15 percent slopes	2,780	0	2,780	0.6
128	Hedox-Porterfield complex, 15 to 30 percent slopes	5,380	0	5,380	1.2
129	Hedox-Porterfield complex, stony, 15 to 30 percent slopes	890	0	890	0.2
130	Inlow-Modoc complex, 0 to 2 percent slopes	1,430	0	1,430	0.3
131	Inlow-Ocho complex, 0 to 2 percent slopes	17,150	0	17,150	3.8
132	Inlow-Ocho-Modoc complex, 0 to 2 percent slopes	5,670	0	5,670	1.3
133	Kalo stony sandy loam, 5 to 30 percent slopes	9,100	0	9,100	2.1
134	Kalo very stony sandy loam, 30 to 50 percent slopes	1,560	0	1,560	0.4
135	Karoc-Rock outcrop complex, 50 to 75 percent slopes	2,260	400	2,660	0.6
136	Laki fine sandy loam, 0 to 2 percent slopes	2,750	6,820	9,570	2.2
137	Laki-Henley complex, 0 to 2 percent slopes	2,110	530	2,640	0.6
138	Lalos very fine sandy loam, 2 to 15 percent slopes	1,280	0	1,280	0.3
139	Lalos-Blownout land complex, 0 to 9 percent slopes	480	0	480	0.1
140	Lamath silt loam, 0 to 1 percent slopes	11,680	40	11,720	2.7
141	Leavers sandy loam, 0 to 2 percent slopes	1,880	0	1,880	0.4
142	Leavers sandy loam, drained, 0 to 5 percent slopes	2,050	30	2,080	0.5
143	Lequieu very stony loam, 0 to 2 percent slopes	1,140	150	1,290	0.3
144	Lequieu-Adieux complex, 0 to 5 percent slopes	0	3,560	3,560	0.8
145	Lorella-Fiddler complex, 5 to 30 percent slopes	1,060	5,680	6,740	1.5
146	Madeline-Capona complex, 2 to 15 percent slopes	2,130	0	2,130	0.5
147	Mahogan-Fredonyer complex, 5 to 30 percent slopes	2,370	0	2,370	0.5
148	Medford silty clay loam, 0 to 2 percent slopes	680	0	680	0.2
149	Modoc loam, 0 to 2 percent slopes	11,020	290	11,310	2.6
150	Modoc loam, bedrock substratum, 2 to 5 percent slopes	1,610	70	1,680	0.4
151	Mojo-Pinehurst complex, 5 to 15 percent slopes	3,720	0	3,720	0.9
152	Mojo-Pinehurst complex, 15 to 30 percent slopes	3,240	0	3,240	0.7
153	Mudco gravelly sandy loam, 2 to 5 percent	720	0	720	0.2
154	Munnell gravelly loam, 0 to 5 percent slopes	3,050	650	3,700	0.8
155	Munnell gravelly loam, slightly wet, 0 to 2 percent slopes	1,630	0	1,630	0.4
156	Ocho Variant silt loam, 0 to 2 percent slopes	690	0	690	0.2
157	Orset sandy loam, 0 to 9 percent slopes	1,450	0	1,450	0.3
158	Pinehurst-Kalo complex, 5 to 15 percent slopes	5,160	0	5,160	1.2
159	Pit silty clay, 0 to 2 percent slopes	1,510	480	1,990	0.5
160	Podus loamy fine sand, 0 to 2 percent slopes	0	1,270	1,270	0.3

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Siskiyou County	Modoc County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Pct
161	Poe loamy fine sand, 0 to 2 percent slopes	280	1,440	1,720	0.4
162	Poman loamy sand, 0 to 2 percent slopes	13,040	30	13,070	3.0
163	Rangee Variant-Dotta complex, 0 to 2 percent slopes	810	0	810	0.2
164	Rojo sandy loam, 0 to 2 percent slopes	2,320	230	2,550	0.6
165	Rojo sandy loam, 2 to 9 percent slopes	6,470	50	6,520	1.5
166	Rubble land	410	40	450	0.1
167	Salisbury-Denbar complex, 0 to 9 percent slopes	2,160	3,560	5,720	1.3
168	Searles-Dunnlake complex, 15 to 30 percent slopes	5,970	0	5,970	1.4
169	Searles-Dunnlake complex, 30 to 50 percent slopes	1,070	0	1,070	0.2
170	Searles-Orhood complex, 15 to 30 percent slopes	14,110	1,130	15,240	3.5
171	Searles-Orhood complex, 30 to 50 percent slopes	10,070	100	10,170	2.3
172	Searles-Rubble land complex, 50 to 75 percent slopes	2,010	390	2,400	0.5
173	Searles-Truax-Orhood complex, 2 to 15 percent slopes	16,700	140	16,840	3.8
174	Searles Variant very stony loam, 0 to 5 percent slopes	610	90	700	0.2
175	Sheld stony sandy loam, 9 to 30 percent slopes	2,170	0	2,170	0.5
176	Sheld very stony sandy loam, 50 to 65 percent slopes	2,030	0	2,030	0.5
177	Snell very stony loam, 5 to 30 percent slopes	1,100	0	1,100	0.3
178	Stukel sandy loam, 5 to 30 percent slopes	3,830	110	3,940	0.9
179	Stukel-Capona complex, 2 to 30 percent slopes	0	3,180	3,180	0.7
180	Teeters silt loam, 0 to 1 percent slopes	4,830	0	4,830	1.1
181	Truax fine sandy loam, 0 to 5 percent slopes	2,760	1,760	4,520	1.0
182	Truax-Searles, 2 to 9 percent slopes	5,140	2,260	7,400	1.7
183	Tulana silt loam, 0 to 1 percent slopes	5,670	2,260	7,930	1.8
184	Tulana Variant mucky peat, 0 to 1 percent slopes	270	0	270	0.1
185	Tulebasin mucky silty clay loam, 0 to 1 percent slopes	20,350	21,210	41,560	9.4
186	Zanbur sandy loam, 0 to 2 percent slopes	290	1,450	1,740	0.4
187	Zuman loamy fine sand, 0 to 1 percent slopes	0	340	340	0.1
188	Zuman silt loam, ponded, 0 to 1 percent slopes	1,550	0	1,550	0.4
	Water	15,000	0	15,000	3.4
	Total	357,440	79,360	436,800	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
102	Capjac silt loam, 0 to 1 percent slopes (where irrigated and drained)
103	Capjac silt loam, ponded, 0 to 1 percent slopes (where irrigated and drained)
106	Dehill fine sandy loam, 0 to 5 percent slopes (where irrigated)
111	Dotta sandy loam, 0 to 5 percent slopes (where irrigated)
117	Eastable loam, 0 to 5 percent slopes (where irrigated)
118	Eastable-Hedox complex, 2 to 9 percent slopes (where irrigated)
119	Esro loam, 0 to 2 percent slopes (where irrigated and drained)
120	Esro loam, drained, 0 to 2 percent slopes (where irrigated and drained)
122	Fordney loamy fine sand, 0 to 2 percent slopes (where irrigated)
124	Fordney loamy fine sand, slightly wet, 0 to 2 percent slopes (where irrigated and drained)
140	Lamath silt loam, 0 to 1 percent slopes (where irrigated and drained)
141	Leavers sandy loam, 0 to 2 percent slopes (where irrigated)
142	Leavers sandy loam, drained, 0 to 5 percent slopes (where irrigated)
148	Medford silty clay loam, 0 to 2 percent slopes (where irrigated)
154	Munnell gravelly loam, 0 to 5 percent slopes (where irrigated)
155	Munnell gravelly loam, slightly wet, 0 to 2 percent slopes (where irrigated)
159	Pit silty clay, 0 to 2 percent slopes (where irrigated)
181	Truax fine sandy loam, 0 to 5 percent slopes (where irrigated)
183	Tulana silt loam, 0 to 1 percent slopes (where irrigated and drained)
185	Tulebasin mucky silty clay loam, 0 to 1 percent slopes (where irrigated and drained)
186	Zanbur sandy loam, 0 to 2 percent slopes (where irrigated)

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management in irrigated areas. Only the soils that are used for irrigated crops or pasture are listed. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Alfalfa hay	Barley	Oats	Pasture	Irish potatoes	Wheat
	Tons	Bu	Bu	AUM*	Cwt	Bu
102: Capjac	5.0	100	125	10.0	400	95
106: Dehill	5.0	85	120	10.0	330	75
110: Doel	5.0	95	110	10.0	300	85
111: Dotta	5.0	110	120	10.0	350	95
117: Eastable	5.0	90	120	10.0	---	80
122: Fordney	5.0	95	120	10.0	330	80
123, 124: Fordney	4.5	95	110	10.0	330	80
136: Laki	5.0	95	120	10.0	300	90
140: Lamath	5.0	100	125	10.0	---	95
141: Leavers	4.5	85	120	10.0	330	75
142: Leavers	5.0	85	120	10.0	330	75
148: Medford	6.0	80	---	10.0	---	70
149: Modoc	5.0	85	110	10.0	300	75
150: Modoc	5.0	85	110	10.0	330	75
153: Mudco	---	35	50	---	---	---
154: Munnell	5.0	85	120	10.0	330	75
155: Munnell	7.5	85	120	10.0	330	75
159: Pit	---	70	---	---	---	65
160: Podus	3.5	75	90	6.0	---	65

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Alfalfa hay	Barley	Oats	Pasture	Irish potatoes	Wheat
	Tons	Bu	Bu	AUM*	Cwt	Bu
161 Poe	5.0	95	120	9.0	330	85
162 Poman	5.0	85	105	10.0	330	75
163** Rangee Variant-Dotta	---	---	---	7.0	---	---
164, 165 Rojo	4.5	85	110	10.0	330	75
180 Teeters	---	60	---	9.0	---	---
181 Truax	5.0	90	120	10.0	350	80
183 Tulana	---	90	155	---	290	---
185 Tulebasin	5.0	100	125	10.0	400	95
186 Zanbur	5.0	95	120	10.0	350	90
187 Zuman	---	---	---	6.5	---	---

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--LAND CAPABILITY

Soil name and map symbol	Land capability	
	N	I
101----------------------- Avis	IVe	---
102----------------------- Capjac	IVw	IIIw
103----------------------- Capjac	Vw	---
104----------------------- Capona	VIe	---
105*---------------------- Capona-Rock outcrop	---	---
106----------------------- Dehill	VIe	IIIe
107----------------------- Dehill	VIe	---
108----------------------- Demox	IVe	---
109*---------------------- Demox-Rubble land	---	---
110----------------------- Doel	VIe	IIIe
111----------------------- Dotta	IVe	IIIe
112*, 113*---------------- Dunnlake-Bucklake	---	---
114*---------------------- Dunnlake-Bucklake-Lequieu	---	---
115*---------------------- Dunnlake-Lequieu	---	---
116*---------------------- Dunnlake-Rangee	---	---
117----------------------- Eastable	VIe	IIIe
118*---------------------- Eastable-Hedox	---	---
119----------------------- Esro	Vw	---
120----------------------- Esro	IVw	---
121----------------------- Forbar	Vw	---

See footnote at end of table.

TABLE 7.--LAND CAPABILITY--Continued

Soil name and map symbol	Land capability	
	N	I
122 Fordney	VIe	IIIe
123 Fordney	VIe	---
124 Fordney	---	IIIw
125* Fredonyer-Mahogan	---	---
126* Fredonyer-Rock outcrop	---	---
127*, 128*, 129* Hedox-Porterfield	---	---
130* Inlow-Modoc	---	---
131* Inlow-Ocho	---	---
132* Inlow-Ocho-Modoc	---	---
133 Kalo	VIe	---
134 Kalo	VIe	---
135* Karoc-Rock outcrop	---	---
136 Laki	VIe	IIIw
137* Laki-Henley	---	---
138 Lalos	VIe	---
139* Lalos-Blownout land	---	---
140 Lamath	VIw	IIIw
141, 142 Leavers	VIe	IIIe
143 Lequieu	VIIs	---
144* Lequieu-Adieux	---	---

See footnote at end of table.

TABLE 7.--LAND CAPABILITY--Continued

Soil name and map symbol	Land capability N	Land capability I
145*: Lorella-Fiddler	---	---
146*: Madeline-Capona	---	---
147*: Mahogan-Fredonyer	---	---
148: Medford	IVc	IIIc
149: Modoc	VIs	IIIs
150: Modoc	VIe	IIIe
151*: Mojo-Pinehurst	---	---
152*: Mojo-Pinehurst	---	---
153: Mudco	VIe	VIe
154: Munnell	VIe	IIIe
155: Munnell	VIw	IIIw
156: Ocho Variant	VIIw	---
157: Orset	IVe	---
158*: Pinehurst-Kalo	---	---
159: Pit	IVw	IIIw
160: Podus	---	IVw
161: Poe	---	IIIw
162: Poman	VIe	IVe
163*: Rangee Variant-Dotta	---	---
164, 165: Rojo	VIe	IIIe

See footnote at end of table.

TABLE 7.--LAND CAPABILITY--Continued

Soil name and map symbol	Land capability	
	N	I
166*. Rubble land		
167*. Salisbury-Denbar	---	---
168*. Searles-Dunnlake	---	---
169*. Searles-Dunnlake	---	---
170*. Searles-Orhood	---	---
171*. Searles-Orhood	---	---
172*. Searles-Rubble land	---	---
173*. Searles-Truax-Orhood	---	---
174. Searles Variant	VIs	---
175. Sheld	IVe	---
176. Sheld	VIIe	---
177. Snell	VIIs	---
178. Stukel	VIe	---
179*. Stukel-Capona	---	---
180. Teeters	---	IIIw
181. Truax	VIe	IIIe
182*. Truax-Searles	---	---
183. Tulana	---	IIIw
184. Tulana Variant	Vw	---
185. Tulebasin	IVw	IIIw

See footnote at end of table.

TABLE 7.--LAND CAPABILITY--Continued

Soil name and map symbol	Land capability	
	N	I
186----------------------- Zanbur	---	IIIw
187----------------------- Zuman	---	IIIw
188----------------------- Zuman	VIw	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--STORIE INDEX RATING

(Absence of an entry indicates that the soil was not rated)

Map symbol	Map unit	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
101	Avis stony sandy loam, 5 to 30 percent slopes	80	70	70	90	35	4	Fertility.
102	Capjac silt loam, 0 to 1 percent slopes	100	100	100	30x95	28	4	Drainage, rare flooding.
103	Capjac silt loam, ponded, 0 to 1 percent slopes	100	100	100	5	5	6	Permanent ponding.
104	Capona cobbly loam, 5 to 30 percent slopes	60	60	70	100	25	4	None.
105	Capona-Rock outcrop complex, 0 to 5 percent slopes					15*	5	
	Capona part	60	60	70	100			None.
	Rock outcrop part.							
106	Dehill fine sandy loam, 0 to 5 percent slopes	95	100	93	100	88	1	None.
107	Dehill fine sandy loam, 5 to 15 percent slopes	95	100	80	100	76	2	None.
108	Demox stony sandy loam, 2 to 15 percent slopes	80	60	80	95	36	4	Fertility.
109	Demox-Rubble land complex, 15 to 50 slopes					8*	6	
	Demox part	80	30	50	95			Fertility.
	Rubble land part.							
110	Doel sandy loam, 0 to 2 percent slopes	33	95	100	90x95	27	4	Drainage, fertility.
111	Dotta sandy loam, 0 to 5 percent slopes	95	95	93	95	80	1	Fertility.
112	Dunnlake-Bucklake complex, 2 to 15 percent slopes					8*	6	
	Dunnlake part	15	50	80	100			None.
	Bucklake part	30	50	80	100			None.
113	Dunnlake-Bucklake complex, 15 to 30 percent slopes					13*	5	
	Dunnlake part	15	50	70	100			None.
	Bucklake part	33	100	70	100			None.
114	Dunnlake-Bucklake-Lequieu complex, 2 to 9 percent slopes					13*	5	
	Dunnlake part	15	50	90	100			None.
	Bucklake part	33	100	90	100			None.
	Lequieu part	23	40	90	100			None.
115	Dunnlake-Lequieu complex, 2 to 9 percent slopes					7*	6	
	Dunnlake part	15	50	90	100			None.
	Lequieu part	23	40	90	100			None.
116	Dunnlake-Rangee complex, 0 to 5 percent slopes					6*	6	
	Dunnlake part	15	50	90	100			None.
	Rangee part	7	80	90	100			None.

See footnote at end of table.

TABLE 8.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
117	Eastable loam, 0 to 5 percent slopes	95	100	93	100	88	1	None.
118	Eastable-Hedox complex, 2 to 9 percent slopes					72*	2	
	Eastable part	95	100	90	100			None.
	Hedox part	65	100	90	100			None.
119	Esro loam, 0 to 2 percent slopes	95	100	100	10x40x95	4	6	Drainage, frequent flooding, fertility.
120	Esro loam, drained, 0 to 2 percent slopes	95	100	100	40x95x95	10	5	Drainage, rare flooding, fertility.
121	Forbar fine sand, 0 to 2 percent slopes	85	65	100	20x95x95	10	5	Drainage, rare flooding, fertility.
122	Fordney loamy fine sand, 0 to 2 percent slopes	85	90	100	95	73	2	Fertility.
123	Fordney loamy fine sand, 5 to 15 percent slopes	85	90	80	95	58	3	Fertility.
124	Fordney loamy fine sand, slightly wet, 0 to 2 percent slopes	85	90	100	60x95	44	3	Drainage, fertility.
125	Fredonyer-Mahogan complex, 30 to 50 percent slopes					14*	5	
	Fredonyer part	40	40	40	100			None.
	Mahogan part	61	100	40	100			None.
126	Fredonyer-Rock outcrop complex, 30 to 50 percent slopes					3*	6	
	Fredonyer part	40	40	40	100			None.
	Rock outcrop part.							
127	Hedox-Porterfield complex, 5 to 15 percent slopes					45*	3	
	Hedox part	65	100	80	100			None.
	Porterfield part	42	100	80	100			None.
128	Hedox-Porterfield complex, 15 to 30 percent slopes					39	4*	
	Hedox part	65	100	70	100			None.
	Porterfield part	42	100	70	100			None.
129	Hedox-Porterfield complex, stony, 15 to 30 percent slopes					24*	4	
	Hedox part	58	70	70	100			None.
	Porterfield part	38	70	70	100			None.
130	Inlow-Modoc complex, 0 to 2 percent slopes					21*	4	
	Inlow part	33	100	100	90x80x80			Drainage, sodicity in the subsoil, microrelief.
	Modoc part	32	100	100	80			Microrelief.
131	Inlow-Ocho complex, 0 to 2 percent slopes					15*	5	
	Inlow part	33	100	100	90x80x80			Drainage, sodicity in the subsoil, microrelief.
	Ocho part	20	100	100	60x80x80			Drainage, sodicity in the subsoil, microrelief.

See footnote at end of table.

TABLE 8.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
132	Inlow-Ocho-Modoc complex, 0 to 2 percent slopes					17*	5	
	Inlow part	33	100	100	90x80x80			Drainage, sodicity in the subsoil, microrelief.
	Ocho part	20	100	100	60x80x80			Drainage, sodicity in the subsoil, microrelief.
	Modoc part	32	100	100	80			Microrelief.
133	Kalo stony sandy loam, 5 to 30 percent slopes	41	70	70	95	19	5	Fertility.
134	Kalo very stony sandy loam, 30 to 50 percent slopes	41	50	70	95	14	5	Fertility.
135	Karoc-Rock outcrop complex, 50 to 75 percent slopes					6*	6	
	Karoc part	80	50	20	75			Fertility.
	Rock outcrop part.							
136	Laki fine sandy loam, 0 to 2 percent slopes	95	100	100	75x60	43	3	Drainage, salinity, sodicity.
137	Laki-Henley complex, 0 to 2 percent slopes					22*	4	
	Laki part	95	100	100	15x60x80			Drainage, salinity, sodicity.
	Henley part	30	95	100	60x50x80			Drainage, salinity, sodicity.
138	Lalos very fine sandy loam, 2 to 15 percent slopes	85	100	80	30	20	4	Salinity, sodicity.
139	Lalos-Blownout land complex, 0 to 9 percent slopes					11*	5	
	Lalos part	85	100	90	30			Salinity, sodicity.
	Blownout land part.							
140	Lamath silt loam, 0 to 1 percent slopes	95	100	100	60x80x95	43	3	Drainage, salinity in the subsoil, rare flooding.
141	Leavers sandy loam, 0 to 2 percent slopes	80	95	100	80x90	55	3	Drainage, fertility.
142	Leavers sandy loam, drained, 0 to 5 percent slopes	80	95	93	90	64	2	Fertility.
143	Lequieu very stony loam, 0 to 2 percent slopes	23	40	100	100	9	6	None.
144	Lequieu-Adieux complex,, 0 to 5 percent slopes					27*	4	
	Lequieu part	23	40	93	100			None.
	Adieux part	60	95	93	95			Fertility.
145	Lorella-Fiddler complex, 5 to 30 percent slopes					6*	6	
	Lorella part	15	50	75	100			None.
	Fiddler part	20	50	75	100			None.

See footnote at end of table.

TABLE 8.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
146	Madeline-Capona complex, 2 to 15 percent slopes					8*	6	
	Madeline part	10	40	80	100			None.
	Capona part	60	60	80	100			None.
147	Mahogan-Fredonyer complex, 5 to 30 percent slopes					30*	4	
	Mahogan part	61	100	70	100			None.
	Fredonyer part	40	40	70	100			None.
148	Medford silty clay loam, 0 to 2 percent slopes	60	90	100	100	54	3	None.
149	Modoc loam, 0 to 2 percent slopes	32	100	100	100	32	4	None.
150	Modoc loam, bedrock substratum, 2 to 5 percent slopes	25	100	93	100	23	4	None.
151	Mojo-Pinehurst complex, 5 to 15 percent slopes					31*	4	
	Mojo part	52	80	80	95			Fertility.
	Pinehurst part	63	60	80	95			Fertility.
152	Mojo-Pinehurst complex, 15 to 30 percent slopes					27*	4	
	Mojo part	52	80	70	95			Fertility.
	Pinehurst part	63	60	70	95			Fertility.
153	Mudco gravelly sandy loam, 2 to 5 percent slopes	20	60	93	95	11	5	Fertility.
154	Munnell gravelly loam, 0 to 5 percent slopes	80	80	93	97	58	3	Fertility.
155	Munnell gravelly loam, slightly wet, 0 to 2 percent slopes	80	80	100	80x97	50	3	Drainage, fertility.
156	Ocho Variant silt loam, 0 to 2 percent slopes	14	100	100	60x60	5	6	Drainage, salinity, sodicity.
157	Orset sandy loam, 0 to 9 percent slopes	70	95	90	95	57	3	Fertility.
158	Pinehurst-Kalo complex, 5 to 15 percent slopes					25*	4	
	Pinehurst part	63	60	80	95			Fertility.
	Kalo part	41	60	80	95			Fertility.
159	Pit silty clay, 0 to 2 percent slopes	85	65	100	85x95	45	3	Drainage, rare flooding.
160	Podus loamy fine sand, 0 to 2 percent slopes	25	90	100	60x95	19	5	Drainage, fertility.
161	Poe loamy fine sand, 0 to 2 percent slopes	37	90	100	60x95	19	5	Drainage, fertility.
162	Poman loamy sand, 0 to 2 percent slopes	35	80	100	95	27	4	Fertility.

See footnote at end of table.

TABLE 8.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
163	Rangee Variant-Dotta complex, 0 to 2 percent slopes					35*	4	
	Rangee Variant part	12	80	100	70x80			Drainage, microrelief.
	Dotta part	95	95	100	80			Microrelief.
164	Rojo sandy loam, 0 to 2 percent slopes	23	95	100	95	21	4	Fertility.
165	Rojo sandy loam, 2 to 9 percent slopes	23	95	90	95	19	5	Fertility.
166	Rubble land	---	---	---	---	0	6	---
167	Salisbury-Denbar complex, 0 to 9 percent slopes					20*	4	
	Salisbury part	23	80	90	100			None.
	Denbar part	30	85	90	100			None.
168	Searles-Dunnlake complex, 15 to 30 percent slopes					12*	5	
	Searles part	50	50	70	100			None.
	Dunnlake part	15	50	70	100			None.
169	Searles-Dunnlake complex, 30 to 50 percent slopes					7*	6	
	Searles part	50	50	40	100			None.
	Dunnlake part	15	50	40	100			None.
170	Searles-Orhood complex, 15 to 30 percent slopes					13*	5	
	Searles part	50	50	70	100			None.
	Orhood part	27	40	70	100			None.
171	Searles-Orhood complex, 30 to 50 percent slopes					8*	6	
	Searles part	50	50	40	100			None.
	Orhood part	27	40	40	100			None.
172	Searles-Rubble land complex, 50 to 75 percent slopes					2*	6	
	Searles part	50	40	20	100			None.
	Rubble land part.							
173	Searles-Truax-Orhood complex, 2 to 15 percent slopes					27*	4	
	Searles part	50	50	80	100			None.
	Truax part	70	100	80	100			None.
	Orhood part	27	40	80	100			None.
174	Searles Variant very stony loam, 0 to 5 percent slopes	38	50	93	100	18	5	None.
175	Sheld stony sandy loam, 9 to 30 percent slopes	73	70	70	95	34	4	Fertility.
176	Sheld very stony sandy loam, 50 to 65 percent slopes	73	60	20	95	8	6	Fertility.
177	Snell very stony loam, 5 to 30 percent slopes	20	60	70	100	8	6	None.
178	Stukel sandy loam, 5 to 30 percent slopes	35	95	70	95	22	4	Fertility.

See footnote at end of table.

TABLE 8.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
179	Stukel-Capona complex, 2 to 30 percent slopes					30*	4	
	Stukel part	35	95	70	95			Fertility.
	Capona part	60	100	70	95			Fertility.
180	Teeters silt loam, 0 to 1 percent slopes	100	100	100	40x60x75	23	4	Drainage, salinity, sodicity, rare flooding.
181	Truax fine sandy loam, 0 to 5 percent slopes	70	100	93	100	65	2	None.
182	Truax-Searles complex, 2 to 9 percent slopes					45*	3	
	Truax part	70	100	90	100			None.
	Searles part	50	50	90	100			None.
183	Tulana silt loam, 0 to 1 percent slopes	100	100	100	40	40	3	Drainage.
184	Tulana Variant mucky peat, 0 to 1 percent slopes	100	100	100	15	15	5	Drainage.
185	Tulebasin mucky silty clay loam, 0 to 1 percent slopes	80	90	100	40x94	27	4	Drainage, rare flooding.
186	Zanbur sandy loam, 0 to 2 percent slopes	90	95	100	70x80x94	45	3	Drainage, salinity in the subsoil.
187	Zuman loamy fine sand, 0 to 1 percent slopes	90	90	100	40x60x95	18	5	Drainage, sodicity, fertility.
188	Zuman silt loam, ponded, 0 to 1 percent slopes	90	100	100	40x60x40	9	6	Drainage, sodicity, frequent flooding.

* Index value is a weighted average of the component part ratings.

TABLE 9.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

(Only the soils that support rangeland vegetation suitable for grazing are listed. The numbers in parentheses after the range site names are the major land resource areas. The letters "Pz" in the names mean precipitation zone, and the numbers before "Pz" indicate the amount of annual precipitation, in inches)

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
104 Capona	Cool Stony Loam 12-14 Pz (21)	Favorable	1,300	Idaho fescue	40
		Normal	1,000	Bluebunch wheatgrass	20
		Unfavorable	700	Thurber needlegrass	10
				Rabbitbrush	5
				Mountain big sagebrush	5
105*:					
Capona	Warm Stony Loam 10-14 Pz (21)	Favorable	1,200	Bluebunch wheatgrass	40
		Normal	900	Thurber needlegrass	20
		Unfavorable	600	Idaho fescue	10
				Mountain big sagebrush	10
Rock outcrop.					
106, 107 Dehill	Deep Loam 12-14 Pz (21)	Favorable	2,200	Basin wildrye	35
		Normal	1,800	Bluebunch wheatgrass	20
		Unfavorable	1,200	Mountain big sagebrush	5
				Rabbitbrush	5
108 Demox	Loamy Slopes 10-14 Pz (21)	Favorable	1,700	Bluebunch wheatgrass	45
		Normal	1,300	Thurber needlegrass	20
		Unfavorable	900	Mountain big sagebrush	5
				Rabbitbrush	5
109*:					
Demox	Loamy Slopes 10-14 Pz (21)	Favorable	1,700	Bluebunch wheatgrass	45
		Normal	1,300	Thurber needlegrass	20
		Unfavorable	900	Mountain big sagebrush	5
				Rabbitbrush	5
Rubble land.					
110 Doel	Sand 10-12 Pz (21)	Favorable	1,200	Basin wildrye	40
		Normal	900	Indian ricegrass	10
		Unfavorable	600	Thurber needlegrass	10
				Rabbitbrush	5
				Big sagebrush	5
111 Dotta	Deep Loam 12-14 Pz (21)	Favorable	2,000	Basin wildrye	35
		Normal	1,500	Bluebunch wheatgrass	20
		Unfavorable	1,200	Idaho fescue	10
				Sandberg bluegrass	10
				Mountain big sagebrush	5
112*:					
Dunnlake	Shallow Stony Loam 10-12 Pz (21).	Favorable	900	Bluebunch wheatgrass	40
		Normal	700	Thurber needlegrass	15
		Unfavorable	500	Low sagebrush	10
Bucklake	Warm Stony Loam 10-14 Pz (21)	Favorable	1,800	Bluebunch wheatgrass	70
		Normal	1,200	Thurber needlegrass	15
		Unfavorable	900	Mountain big sagebrush	5
				Antelope bitterbrush	5

See footnote at end of table.

TABLE 9.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
113*:					
Dunnlake	Shallow Stony Loam 10-12 Pz (21).	Favorable	900	Bluebunch wheatgrass	40
		Normal	700	Thurber needlegrass	15
		Unfavorable	500	Low sagebrush	10
Bucklake.					
114*:					
Dunnlake	Shallow Stony Loam 10-12 Pz (21).	Favorable	900	Bluebunch wheatgrass	40
		Normal	700	Thurber needlegrass	15
		Unfavorable	500	Low sagebrush	10
Bucklake.					
Lequieu	Very Shallow Stony Loam 10-14 Pz (21).	Favorable	800	Bluebunch wheatgrass	40
		Normal	600	Low sagebrush	20
		Unfavorable	500	Idaho fescue	10
115*:					
Dunnlake	Shallow Stony Loam 10-12 Pz (21).	Favorable	900	Bluebunch wheatgrass	40
		Normal	700	Thurber needlegrass	15
		Unfavorable	500	Low sagebrush	10
				Rabbitbrush	5
Lequieu	Very Shallow Stony Loam 10-14 Pz (21).	Favorable	800	Bluebunch wheatgrass	40
		Normal	600	Low sagebrush	20
		Unfavorable	500	Idaho fescue	10
116*:					
Dunnlake	Shallow Loam 10-14 Pz (21)	Favorable	1,000	Bluebunch wheatgrass	40
		Normal	800	Thurber needlegrass	15
		Unfavorable	600	Low sagebrush	10
				Rabbitbrush	5
Rangee	Shallow Loam 10-14 Pz (21)	Favorable	1,000	Bluebunch wheatgrass	40
		Normal	800	Thurber needlegrass	15
		Unfavorable	600	Low sagebrush	10
				Rabbitbrush	5
117 Eastable	Chalky Loam 10-12 Pz (21)	Favorable	2,000	Basin wildrye	45
		Normal	1,600	Thurber needlegrass	10
		Unfavorable	1,200	Mountain big sagebrush	5
				Rabbitbrush	5
118*:					
Eastable	Chalky Loam 10-12 Pz (21)	Favorable	2,000	Basin wildrye	45
		Normal	1,600	Thurber needlegrass	10
		Unfavorable	1,200	Mountain big sagebrush	5
				Rabbitbrush	5
Hedox	Chalky Loam 10-12 Pz (21)	Favorable	2,000	Basin wildrye	45
		Normal	1,600	Thurber needlegrass	10
		Unfavorable	1,200	Mountain big sagebrush	5
				Rabbitbrush	5

See footnote at end of table.

TABLE 9.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
119----------------- Esro	Wet Meadow 16-24 Pz (22)	Favorable	2,500	Carex	30
		Normal	2,000	Rush	20
		Unfavorable	1,800	Tufted hairgrass	10
				Northern mannagrass	10
				Clover	5
				Willow	5
120----------------- Esro	Semi-Wet Meadow 16-24 Pz (22)	Favorable	2,500	Tufted hairgrass	20
		Normal	1,800	Carex	20
		Unfavorable	1,200	Clover	10
				Kentucky bluegrass	10
				Sandberg bluegrass	10
				Willow	5
122, 123----------- Fordney	Deep Sandy Loam 10-12 Pz (21)	Favorable	2,500	Needleandthread	20
		Normal	1,800	Indian ricegrass	15
		Unfavorable	1,200	Beardless wildrye	10
				Antelope bitterbrush	5
				Wyoming big sagebrush	5
125*:					
Fredonyer----------	Very Stony Loam 14-16 Pz (21)	Favorable	2,000	Curlleaf mountainmahogany	25
		Normal	1,800	Idaho fescue	20
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Mountain big sagebrush	5
Mahogan------------	Loam 14-16 Pz (21)	Favorable	2,000	Idaho fescue	30
		Normal	1,800	Bluebunch wheatgrass	10
		Unfavorable	1,500	Nevada bluegrass	10
				Curlleaf mountainmahogany	10
				Mountain big sagebrush	5
126*:					
Fredonyer----------	Very Stony Loam 14-16 Pz (21)	Favorable	2,000	Curlleaf mountainmahogany	25
		Normal	1,800	Idaho fescue	20
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Mountain big sagebrush	5
Rock outcrop.					
127*:					
Hedox--------------	Chalky Loam 10-12 Pz (21)	Favorable	2,000	Basin wildrye	45
		Normal	1,600	Thurber needlegrass	10
		Unfavorable	1,200	Bluebunch wheatgrass	5
				Mountain big sagebrush	5
				Rabbitbrush	5
Porterfield--------	Chalky Loam 10-12 Pz (21)	Favorable	2,000	Basin wildrye	40
		Normal	1,600	Bluebunch wheatgrass	15
		Unfavorable	1,200	Mountain big sagebrush	5
				Rabbitbrush	5
128*:					
Hedox--------------	Chalky Loam 10-12 Pz (21)	Favorable	2,000	Basin wildrye	45
		Normal	1,600	Thurber needlegrass	10
		Unfavorable	1,200	Bluebunch wheatgrass	5
				Mountain big sagebrush	5
				Rabbitbrush	5

See footnote at end of table.

TABLE 9.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
128*:					
Porterfield	Chalky Loam 10-12 Pz (21)	Favorable	2,000	Basin wildrye	40
		Normal	1,600	Bluebunch wheatgrass	15
		Unfavorable	1,200	Mountain big sagebrush	5
				Rabbitbrush	5
129*:					
Hedox	Stony Chalky Loam 10-12 Pz (21).	Favorable	1,700	Bluebunch wheatgrass	25
		Normal	1,300	Basin wildrye	25
		Unfavorable	900	Mountain big sagebrush	5
				Rabbitbrush	5
Porterfield	Stony Chalky Loam 10-12 Pz (21).	Favorable	1,700	Bluebunch wheatgrass	25
		Normal	1,200	Basin wildrye	25
		Unfavorable	900	Mountain big sagebrush	5
				Rabbitbrush	5
130*:					
Inlow	Sodic Mounds 10-12 Pz (21)	Favorable	1,000	Basin wildrye	40
		Normal	800	Saltgrass	10
		Unfavorable	500	Black greasewood	10
				Spiny hopsage	10
				Rabbitbrush	5
Modoc	Loamy Mounds 10-12 Pz (21)	Favorable	1,800	Basin wildrye	40
		Normal	1,500	Beardless wildrye	10
		Unfavorable	1,200	Basin big sagebrush	10
131*:					
Inlow	Sodic Mounds 10-12 Pz (21)	Favorable	1,000	Basin wildrye	40
		Normal	800	Saltgrass	10
		Unfavorable	500	Black greasewood	10
				Spiny hopsage	10
				Rabbitbrush	5
Ocho	Sodic Hardpan 10-12 Pz (21)	Favorable	200	Annual hairgrass	30
		Normal	150	Black greasewood	10
		Unfavorable	50	Spiny hopsage	10
				Saltgrass	10
				Claspingleaf pepperweed	10
132*:					
Inlow	Sodic Mounds 10-12 Pz (21)	Favorable	1,000	Basin wildrye	40
		Normal	800	Saltgrass	10
		Unfavorable	500	Black greasewood	10
				Spiny hopsage	10
				Rabbitbrush	5
Ocho	Sodic Hardpan 10-12 Pz (21)	Favorable	200	Annual hairgrass	30
		Normal	150	Black greasewood	10
		Unfavorable	50	Spiny hopsage	10
				Saltgrass	10
				Claspingleaf pepperweed	10
Modoc	Loamy Mounds 10-12 Pz (21)	Favorable	1,800	Basin wildrye	40
		Normal	1,500	Beardless wildrye	10
		Unfavorable	1,200	Basin big sagebrush	10

See footnote at end of table.

TABLE 9.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
135*:					
Karoc	Loamy Slopes 10-14 Pz (21)	Favorable	1,700	Bluebunch wheatgrass	40
		Normal	1,300	Thurber needlegrass	20
		Unfavorable	900	Mountain big sagebrush	5
				Rabbitbrush	5
Rock outcrop.					
137*:					
Laki	Saline Sodic Terrace 10-12 Pz (21).	Favorable	1,200	Inland saltgrass	25
		Normal	1,000	Basin wildrye	25
		Unfavorable	800	Black greasewood	15
				Rabbitbrush	5
Henley	Saline Sodic Flat 10-12 Pz (21).	Favorable	900	Basin wildrye	40
		Normal	600	Black greasewood	15
		Unfavorable	400	Rabbitbrush	15
				Inland saltgrass	10
138 Lalos	Saline Sodic Dunes 10-12 Pz (21).	Favorable	1,600	Basin wildrye	50
		Normal	1,400	Inland saltgrass	10
		Unfavorable	1,000	Black greasewood	10
				Spiny hopsage	10
139*:					
Lalos	Saline Sodic Dunes 10-12 Pz (21).	Favorable	1,600	Basin wildrye	50
		Normal	1,400	Inland saltgrass	10
		Unfavorable	1,000	Black greasewood	10
				Spiny hopsage	10
Blownout land.					
140 Lamath	Saline Meadow 10-12 Pz (21)	Favorable	2,000	Inland saltgrass	50
		Normal	1,800	Foxtail barley	15
		Unfavorable	1,200	Carex	10
				Black greasewood	5
				Beardless wildrye	5
143 Lequieu	Very Shallow Stony Loam 10-14 Pz (21).	Favorable	800	Bluebunch wheatgrass	40
		Normal	600	Low sagebrush	20
		Unfavorable	500	Idaho fescue	10
144*:					
Lequieu	Very Shallow Stony Loam 10-14 Pz (21).	Favorable	800	Bluebunch wheatgrass	40
		Normal	600	Low sagebrush	20
		Unfavorable	500	Idaho fescue	10
Adieux	Loam 10-14 Pz (21)	Favorable	2,000	Bluebunch wheatgrass	25
		Normal	1,500	Idaho fescue	10
		Unfavorable	1,000	Thurber needlegrass	10
				Mountain big sagebrush	10
				Rabbitbrush	5
146*:					
Madeline	Shallow Stony Loam 12-14 Pz (21).	Favorable	1,100	Idaho fescue	50
		Normal	900	Bluebunch wheatgrass	10
		Unfavorable	700	Low sagebrush	5
				Rabbitbrush	5

See footnote at end of table.

TABLE 9.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo- sition
			Lb/acre		Pct
146*:					
Capona	Cool Stony Loam 12-14 Pz (21)	Favorable	1,300	Idaho fescue	40
		Normal	1,000	Bluebunch wheatgrass	20
		Unfavorable	700	Thurber needlegrass	10
				Rabbitbrush	5
				Mountain big sagebrush	5
147*:					
Mahogan	Loam 14-16 Pz (21)	Favorable	2,000	Idaho fescue	30
		Normal	1,800	Bluebunch wheatgrass	10
		Unfavorable	1,500	Curlleaf mountainmahogany	10
				Mountain big sagebrush	5
Fredonyer	Very Stony Loam 14-16 Pz (21)	Favorable	2,000	Curlleaf mountainmahogany	25
		Normal	1,800	Idaho fescue	20
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Mountain big sagebrush	5
149 Modoc	Loamy Mounds 10-12 Pz (21)	Favorable	1,800	Basin wildrye	40
		Normal	1,500	Basin big sagebrush	10
		Unfavorable	1,200	Beardless wildrye	10
150 Modoc	Loam 10-14 Pz (21)	Favorable	1,800	Bluebunch wheatgrass	25
		Normal	1,500	Idaho fescue	10
		Unfavorable	1,200	Basin big sagebrush	10
				Basin wildrye	5
154 Munnell	Loam 10-14 Px (21)	Favorable	2,000	Bluebunch wheatgrass	30
		Normal	1,500	Idaho fescue	10
		Unfavorable	1,000	Thurber needlegrass	10
				Mountain big sagebrush	5
				Rabbitbrush	5
156 Ocho Variant	Sodic Hardpan 10-12 Px (21)	Favorable	200	Annual hairgrass	40
		Normal	150	Bottlebrush squirreltail	20
		Unfavorable	50	Claspingleaf pepperweed	20
				Aster	5
159 Pit	Clay Basin 12-14 Px (21)	Favorable	1,500	Silver sagebrush	20
		Normal	1,200	Basin wildrye	20
		Unfavorable	1,000	Beardless wildrye	15
				Tufted hairgrass	10
				Rabbitbrush	5
162 Poman	Sand 10-12 Pz (21)	Favorable	1,200	Basin wildrye	40
		Normal	900	Indian ricegrass	10
		Unfavorable	600	Thurber needlegrass	10
				Rabbitbrush	5
				Basin big sagebrush	5
				Saltgrass	5
164, 165 Rojo	Sandy Loam 10-14 Pz (21)	Favorable	1,200	Thurber needlegrass	20
		Normal	900	Bluebunch wheatgrass	10
		Unfavorable	600	Mountain big sagebrush	10
				Western needlegrass	10
				Needleandthread	10
				Rabbitbrush	5

See footnote at end of table.

TABLE 9.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
167: Salisbury	Loam 10-14 Pz (21)	Favorable	1,200	Idaho fescue	25
		Normal	900	Bluebunch wheatgrass	20
		Unfavorable	700	Thurber needlegrass	15
				Mountain big sagebrush	5
Denbar	Shallow Loam 10-14 Pz (21)	Favorable	1,000	Bluebunch wheatgrass	45
		Normal	800	Thurber needlegrass	15
		Unfavorable	600	Idaho fescue	10
				Low sagebrush	10
168*:					
Searles	Warm Stony Loam 10-14 Pz (21)	Favorable	1,800	Bluebunch wheatgrass	50
		Normal	1,200	Antelope bitterbrush	5
		Unfavorable	900	Mountain big sagebrush	5
Dunnlake	Shallow Stony Loam 10-12 Pz (21).	Favorable	900	Bluebunch wheatgrass	40
		Normal	700	Thurber needlegrass	15
		Unfavorable	500	Low sagebrush	10
169*:					
Searles	Warm Stony Loam 10-14 Pz (21)	Favorable	1,800	Bluebunch wheatgrass	50
		Normal	1,200	Antelope bitterbrush	5
		Unfavorable	900	Mountain big sagebrush	5
Dunnlake	Shallow Stony Loam 10-12 Pz (21).	Favorable	900	Bluebunch wheatgrass	40
		Normal	700	Thurber needlegrass	15
		Unfavorable	500	Low sagebrush	10
170*, 171*:					
Searles	Warm Stony Loam 10-14 Pz (21)	Favorable	1,800	Bluebunch wheatgrass	50
		Normal	1,200	Antelope bitterbrush	5
		Unfavorable	900	Mountain big sagebrush	5
Orhood.					
172*:					
Searles	Warm Stony Loam 10-14 Pz (21)	Favorable	1,800	Bluebunch wheatgrass	50
		Normal	1,200	Antelope bitterbrush	5
		Unfavorable	900	Mountain big sagebrush	5
Rubble land.					
173*:					
Searles	Warm Stony Loam 10-14 Pz (21)	Favorable	1,800	Bluebunch wheatgrass	50
		Normal	1,200	Antelope bitterbrush	5
		Unfavorable	900	Mountain big sagebrush	5
Truax	Deep Loam 12-14 Pz (21)	Favorable	1,800	Basin wildrye	35
		Normal	1,400	Bluebunch wheatgrass	25
		Unfavorable	1,000	Idaho fescue	5
				Mountain big sagebrush	5
Orhood.					
174: Searles Variant	Very Stony Loam 10-12 Pz (21)	Favorable	1,000	Basin wildrye	20
		Normal	800	Basin big sagebrush	5
		Unfavorable	600	Rabbitbrush	5

See footnote at end of table.

TABLE 9.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
177: Snell	Shallow Stony Loam 16-24 Pz (22).	Favorable	1,000	Idaho fescue	35
		Normal	800	Lemon needlegrass	10
		Unfavorable	600	Low sagebrush	5
178: Stukel	Sandy Loam 10-14 Pz (21)	Favorable	1,700	Thurber needlegrass	20
		Normal	1,300	Western needlegrass	10
		Unfavorable	500	Bluebunch wheatgrass	10
				Idaho fescue	10
				Antelope bitterbrush	10
				Big sagebrush	5
179*:					
Stukel	Sandy Loam 10-14 Pz (21)	Favorable	1,700	Thurber needlegrass	20
		Normal	1,300	Western needlegrass	10
		Unfavorable	500	Bluebunch wheatgrass	10
				Idaho fescue	10
				Antelope bitterbrush	10
				Big sagebrush	5
Capona	Deep Sandy Loam 10-12 Pz (21)	Favorable	1,400	Needleandthread	40
		Normal	1,100	Thurber needlegrass	10
		Unfavorable	900	Big sagebrush	5
181: Truax	Deep Loam 10-12 Pz (21)	Favorable	1,800	Basin wildrye	35
		Normal	1,400	Bluebunch wheatgrass	25
		Unfavorable	1,000	Mountain big sagebrush	5
				Rabbitbrush	5
182*:					
Truax	Deep Loam 10-12 Pz (21)	Favorable	2,000	Basin wildrye	35
		Normal	1,800	Bluebunch wheatgrass	20
		Unfavorable	1,200	Idaho fescue	10
				Mountain big sagebrush	5
				Rabbitbrush	5
Searles	Warm Stony Loam 10-14 Pz (21)	Favorable	1,800	Bluebunch wheatgrass	50
		Normal	1,200	Antelope bitterbrush	5
		Unfavorable	900	Mountain big sagebrush	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that the soil was not rated)

Map symbol and soil name	Ordination symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equipment limitation	Seedling mortality	Plant competition	Susceptibility of the soil to damage from--: Fire	Susceptibility of the soil to damage from--: Compaction	Hazard of sheet and rill erosion after harvest in--: Bare areas	Hazard of sheet and rill erosion after harvest in--: Areas yarded by tractor	Hazard of sheet and rill erosion after harvest in--: Areas yarded by cable
101---------------- Avis	4F	Ponderosa pine----	73*	68-86	Slight	Moderate	Moderate	Moderate	Slight	Moderate	Slight	Slight.
		Douglas-fir-------	---	---								
		White fir---------	64	50-81								
		California red fir	46	45-47								
		Incense cedar-----	---	---								
133---------------- Kalo	4F	Ponderosa pine----	71*	69-72	Slight	Moderate	Moderate	Moderate	Slight	Moderate	Slight	Slight.
		Douglas-fir-------	80*	79-80								
		Incense cedar-----	---	---								
		Oregon white oak--	---	---								
		Western juniper---	---	---								
		White fir---------	---	---								
134---------------- Kalo	4R	Ponderosa pine----	71*	69-72	Moderate	Severe	Moderate	Moderate	Slight	Severe	Moderate	Slight.
		Douglas-fir-------	80*	79-80								
		Incense cedar-----	---	---								
		Oregon white oak--	---	---								
		Western juniper---	---	---								
		White fir---------	---	---								
151**: Mojo--------------	3A	Ponderosa pine----	60*	56-63	Slight	Slight	Moderate	Slight	Slight	Slight	Slight	---
		Incense cedar-----	---	---								
		Douglas-fir-------	---	---								
		White fir---------	---	---								
		Western juniper---	---	---								
Pinehurst (warm)--	4A	Ponderosa pine----	73*	70-80	Slight	Slight	Moderate	Slight	Moderate	Slight	Slight	---
		Douglas-fir-------	94	90-97								
		Incense cedar-----	---	---								
		White fir---------	50	49-50								
		Sugar pine--------	---	---								
152**: Mojo--------------	3A	Ponderosa pine----	60*	56-63	Slight	Slight	Moderate	Slight	Slight	Moderate	Slight	Slight.
		Incense cedar-----	---	---								
		Douglas-fir-------	---	---								
		White fir---------	---	---								
		Western juniper---	---	---								

See footnotes at end of table.

TABLE 10.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equipment limitation	Seedling mortality	Plant competition	Susceptibility of the soil to damage from--: Fire	Susceptibility of the soil to damage from--: Compaction	Hazard of sheet and rill erosion after harvest in--: Bare areas	Hazard of sheet and rill erosion after harvest in--: Areas yarded by tractor	Hazard of sheet and rill erosion after harvest in--: Areas yarded by cable
152**:												
Pinehurst (warm)--	4A	Ponderosa pine----	73*	70-80	Slight	Slight	Moderate	Slight	Moderate	Moderate	Slight	Slight.
		Douglas-fir-------	94	90-97								
		Incense cedar-----	---	---								
		White fir---------	50	49-50								
		Sugar pine--------	---	---								
157----------------	4A	Ponderosa pine----	76*	72-81	Slight	Moderate	Moderate	Moderate	Severe	Slight	Slight	---
Orset		Douglas-fir-------	---	---								
		White fir---------	---	---								
		Incense cedar-----	---	---								
158**:												
Pinehurst (cool)--	6A	Ponderosa pine----	92*	90-93	Slight	Slight	Severe	Slight	Moderate	Slight	Slight	---
		Douglas-fir-------	110*	100-117								
		Incense cedar-----	58	55-60								
		White fir---------	---	---								
		Sugar pine--------	---	---								
		Black oak---------	---	---								
Kalo--------------	4F	Ponderosa pine----	71*	69-72	Slight	Moderate	Slight	Moderate	Slight	Slight	Slight	---
		Douglas-fir-------	80*	79-80								
		Incense cedar-----	---	---								
		Oregon white oak--	---	---								
		Western juniper---	---	---								
		White fir---------	---	---								
175----------------	9F	White fir---------	62*	56-70	Slight	Slight	Moderate	Slight	Slight	Moderate	Slight	Slight.
Sheld		Ponderosa pine----	89	82-94								
		Douglas-fir-------	84	80-88								
		Incense cedar-----	---	---								
		California red fir	---	---								
176----------------	9R	White fir---------	62*	56-70	Severe	Moderate	Moderate	Moderate	Slight	Severe	Severe	Slight.
Sheld		Ponderosa pine----	89	82-94								
		Douglas-fir-------	84	80-88								
		Incense cedar-----	---	---								
		California red fir	---	---								

* Site index is a summary of five or more measurements on this soil.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Only the soils that are used for windbreaks or environmental plantings are listed. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
102. Capjac	---	Multiflora rose.	Russian-olive.	Golden willow, Scotch pine, Siberian elm.	Hybrid poplar.
106, 107. Dehill	---	Lilac, Nanking cherry, Tatarian honeysuckle.	Russian-olive, American plum, Siberian peashrub.	Black locust, green ash, Norway spruce.	Ponderosa pine, Lombardy poplar, hybrid poplar.
110. Doel	---	Nanking cherry, Tatarian honeysuckle.	Russian-olive, American plum, Siberian elm.	Black locust, Lombardy poplar, black cottonwood.	Ponderosa pine, black locust, hybrid poplar.
111. Dotta	---	Tatarian honeysuckle, Nanking cherry, lilac.	Russian-olive, American plum, Siberian elm.	Black locust, green ash, Norway spruce.	Ponderosa pine, Lombardy poplar, hybrid poplar.
117. Eastable	---	Lilac, Siberian peashrub, Tatarian honeysuckle.	Russian-olive, American plum, Siberian elm.	Honeylocust, Lombardy poplar, black cottonwood.	Ponderosa pine, black locust, Norway spruce.
118*:					
Eastable	---	Lilac, Siberian peashrub, Tatarian honeysuckle.	Russian-olive, American plum, Siberian elm.	Honeylocust, Lombardy poplar, black cottonwood.	Ponderosa pine, black locust, Norway spruce.
Hedox.					
122, 123, 124. Fordney	---	Lilac, Nanking cherry, multiflora rose.	Russian-olive, Siberian peashrub.	Black locust, Siberian elm, Scotch pine.	Ponderosa pine, Lombardy poplar, hybrid poplar.
130*:					
Inlow	---	Multiflora rose.	Russian-olive.	Black locust, hackberry, golden willow.	Scotch pine, green ash, Siberian elm.
Modoc	---	Tatarian honeysuckle, Nanking cherry.	American plum, Siberian peashrub.	Black locust, Siberian elm, Scotch pine.	Ponderosa pine, hybrid poplar.
131*:					
Inlow	---	Multiflora rose.	Russian-olive.	Black locust, golden willow.	Scotch pine, green ash, Siberian elm.
Ocho.					
132*:					
Inlow	---	Multiflora rose.	Russian-olive.	Black locust, golden willow.	Scotch pine, green ash, Siberian elm.

See footnote at end of table.

TABLE 11.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
132*: Ocho.					
Modoc	---	Tatarian honeysuckle, Nanking cherry.	American plum, Siberian peashrub.	Black locust, Siberian elm, Scotch pine.	Ponderosa pine, hybrid poplar.
136 Laki	---	Multiflora rose	Russian-olive, golden willow, American plum.	Black locust, Siberian elm, Scotch pine.	---
137*: Laki	---	Multiflora rose	Russian-olive, golden willow, American plum.	Black locust, Siberian elm, Scotch pine.	---
Henley.					
138 Lalos	---	Multiflora rose	Russian-olive, golden willow, American plum.	Black locust, Siberian elm, Scotch pine.	---
139*: Lalos	---	Multiflora rose	Russian-olive, golden willow, American plum.	Black locust, Siberian elm, Scotch pine.	---
Blownout land.					
140 Lamath	---	Multiflora rose	American plum, Russian-olive, golden willow.	Black locust, Siberian elm, Scotch pine.	---
141 Leavers	---	Multiflora rose	Russian-olive	Golden willow, Scotch pine, Siberian elm.	Hybrid poplar.
142 Leavers	---	Lilac, Nanking cherry, Tatarian honeysuckle.	Russian-olive, American plum, Siberian peashrub.	Black locust, green ash, Norway spruce.	Ponderosa pine, Lombardy poplar, hybrid poplar.
149 Modoc	---	Tatarian honeysuckle, Nanking cherry.	American plum, Siberian peashrub.	Black locust, Siberian elm, Scotch pine.	Ponderosa pine, hybrid poplar.
150 Modoc	---	Tatarian honeysuckle, Nanking cherry, pyracantha.	American plum, Siberian peashrub.	Black locust, Siberian elm, Scotch pine.	Ponderosa pine, hybrid poplar.
154 Munnell	---	Lilac, Nanking cherry, Tatarian honeysuckle.	Russian-olive, American plum, Siberian peashrub.	Black locust, green ash, Norway spruce.	Ponderosa pine, Lombardy poplar, hybrid poplar.
155 Munnell	---	Multiflora rose	Russian-olive	Golden willow, Scotch pine, Siberian elm.	Hybrid poplar.

See footnote at end of table.

TABLE 11.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
160 Podus	---	Multiflora rose	Russian-olive	Golden willow, Scotch pine, Siberian elm.	Hybrid poplar.
161 Poe	---	Lilac, Nanking cherry, multiflora rose.	Russian-olive, Siberian peashrub.	Black locust, Siberian elm, Scotch pine.	Ponderosa pine, Lombardy poplar, hybrid poplar.
162 Poman	---	Lilac, Nanking cherry, multiflora rose.	Russian-olive, Siberian peashrub.	Black locust, Siberian elm, Scotch pine.	Ponderosa pine, Lombardy poplar, hybrid poplar.
164, 165 Rojo	---	Tatarian honeysuckle, Nanking cherry, pyracantha.	American plum, Siberian peashrub.	Black locust, Siberian elm, Scotch pine.	Ponderosa pine, hybrid poplar.
181 Truax	---	Lilac, Nanking cherry, Tatarian honeysuckle.	Russian-olive, American plum, Siberian peashrub.	Black locust, green ash, Norway spruce.	Ponderosa pine, Lombardy poplar, hybrid poplar.
186 Zanbur	---	Multiflora rose	Russian-olive, golden willow, American plum.	Black locust, Siberian elm, Scotch pine.	---
187, 188 Zuman	---	Multiflora rose	Russian-olive, golden willow, American plum.	Black locust, Siberian elm, Scotch pine.	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
101 Avis	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
102 Capjac	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
103 Capjac	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
104 Capona	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: large stones, slope, dusty.
105*:				
Capona	Moderate: large stones, dusty.	Moderate: large stones, dusty.	Severe: large stones.	Moderate: large stones, dusty.
Rock outcrop.				
106 Dehill	Slight	Slight	Moderate: slope.	Slight.
107 Dehill	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
108 Demox	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
109*:				
Demox	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.
Rubble land.				
110 Doel	Slight	Slight	Moderate: small stones.	Slight.
111 Dotta	Slight	Slight	Moderate: slope, small stones.	Slight.
112*:				
Dunnlake	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones.
Bucklake	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope, small stones.	Severe: large stones.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
113*:				
Dunnlake	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.
Bucklake	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
114*:				
Dunnlake	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, small stones.	Moderate: large stones.
Bucklake	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, depth to rock.	Moderate: dusty.
Lequieu	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.	Severe: large stones.
115*:				
Dunnlake	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, small stones.	Moderate: large stones.
Lequieu	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.	Severe: large stones.
116*:				
Dunnlake	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: erodes easily.
Rangee	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock, percs slowly.	Slight.
117 Eastable	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
118*:				
Eastable	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
Hedox	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, depth to rock.	Moderate: dusty.
119 Esro	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
120------------------- Esro	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight.
121------------------- Forbar	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.
122------------------- Fordney	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
123------------------- Fordney	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.
124------------------- Fordney	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight.
125*:				
Fredonyer------------	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.
Mahogan--------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
126*:				
Fredonyer------------	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.
Rock outcrop.				
127*:				
Hedox----------------	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
Porterfield----------	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: dusty.
128*:				
Hedox----------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
Porterfield----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.
129*:				
Hedox----------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: large stones, slope, dusty.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
129*:				
Porterfield	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.
130*:				
Inlow	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Moderate: dusty.
Modoc	Moderate: dusty.	Moderate: dusty.	Moderate: small stones.	Moderate: dusty.
131*:				
Inlow	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Moderate: dusty.
Ocho	Severe: ponding, cemented pan, excess sodium.	Severe: ponding, cemented pan, excess sodium.	Severe: ponding, cemented pan, excess sodium.	Severe: ponding.
132*:				
Inlow	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Moderate: dusty.
Ocho	Severe: ponding, cemented pan, excess sodium.	Severe: ponding, cemented pan, excess sodium.	Severe: ponding, cemented pan, excess sodium.	Severe: ponding.
Modoc	Moderate: dusty.	Moderate: dusty.	Moderate: small stones.	Moderate: dusty.
133 Kalo	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: large stones, slope.
134 Kalo	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.
135*:				
Karoc	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.
Rock outcrop.				
136 Laki	Severe: flooding.	Slight	Slight	Slight.
137*:				
Laki	Severe: flooding, excess salt.	Severe: excess salt.	Severe: excess salt.	Slight.
Henley	Severe: flooding, wetness.	Moderate: wetness, excess salt.	Severe: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
138: Lalos	Severe: excess sodium.	Severe: excess sodium.	Severe: slope, excess sodium.	Severe: erodes easily.
139*:				
Lalos	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Moderate: dusty.
Blownout land.				
140: Lamath	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
141: Leavers	Slight	Slight	Slight	Slight.
142: Leavers	Slight	Slight	Moderate: slope.	Slight.
143: Lequieu	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.	Severe: large stones.
144*:				
Lequieu	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.	Severe: large stones.
Adieux	Slight	Slight	Moderate: slope, depth to rock.	Slight.
145*:				
Lorella	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, small stones.	Severe: large stones.
Fiddler	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: large stones, slope, dusty.
146*:				
Madeline	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.
Capona	Moderate: slope, large stones, dusty.	Moderate: slope, large stones, dusty.	Severe: large stones, slope.	Moderate: large stones, dusty.
147*:				
Mahogan	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
147*:				
Fredonyer	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope, dusty.
148 Medford	Slight	Slight	Moderate: small stones.	Slight.
149 Modoc	Moderate: dusty.	Moderate: dusty.	Moderate: small stones.	Moderate: dusty.
150 Modoc	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, cemented pan.	Moderate: dusty.
151*:				
Mojo	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
Pinehurst	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.
152*:				
Mojo	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
Pinehurst	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: large stones, slope.
153 Mudco	Severe: cemented pan.	Severe: cemented pan.	Severe: small stones, cemented pan.	Slight.
154, 155 Munnell	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: small stones.	Moderate: dusty.
156 Ocho Variant	Severe: ponding, cemented pan, excess sodium.	Severe: ponding, excess sodium, cemented pan.	Severe: ponding, cemented pan, excess sodium.	Severe: ponding.
157 Orset	Slight	Slight	Moderate: slope, small stones.	Slight.
158*:				
Pinehurst	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.
Kalo	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: large stones.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
159 Pit	Severe: flooding.	Moderate: too clayey.	Moderate: too clayey, flooding.	Moderate: too clayey.
160 Podus	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Moderate: wetness, too sandy.
161 Poe	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight.
162 Poman	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
163*:				
Rangee Variant	Severe: ponding, cemented pan.	Severe: ponding, cemented pan.	Severe: ponding, cemented pan.	Severe: ponding.
Dotta	Slight	Slight	Moderate: small stones.	Slight.
164 Rojo	Slight	Slight	Moderate: small stones.	Slight.
165 Rojo	Slight	Slight	Moderate: slope, small stones, depth to rock.	Slight.
166*. Rubble land				
167*:				
Salisbury	Moderate: large stones.	Moderate: large stones.	Severe: large stones, small stones.	Moderate: large stones.
Denbar	Slight	Slight	Moderate: slope, small stones, percs slowly.	Slight.
168*:				
Searles	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope.	Moderate: large stones.
Dunnlake	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.
169*:				
Searles	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope.	Severe: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
169*:				
Dunnlake	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.
170*:				
Searles	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope.	Moderate: large stones.
Orhood	Severe: slope, large stones, depth to rock.	Severe: slope, large stones, depth to rock.	Severe: large stones, slope, small stones.	Severe: large stones.
171*:				
Searles	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope.	Severe: slope.
Orhood	Severe: slope, large stones, depth to rock.	Severe: slope, large stones, depth to rock.	Severe: large stones, slope, small stones.	Severe: large stones, slope.
172*:				
Searles	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope.	Severe: slope.
Rubble land.				
173*:				
Searles	Severe: small stones.	Severe: small stones.	Severe: large stones, slope.	Moderate: large stones.
Truax	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Orhood	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, slope, small stones.	Severe: large stones.
174 Searles Variant	Severe: small stones.	Severe: small stones.	Severe: large stones, small stones.	Moderate: large stones, dusty.
175 Sheld	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
176 Sheld	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
177: Snell	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: large stones.
178: Stukel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
179*:				
Stukel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
Capona	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
180: Teeters	Severe: flooding, excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
181: Truax	Slight	Slight	Moderate: slope.	Slight.
182*:				
Truax	Slight	Slight	Moderate: slope.	Slight.
Searles	Severe: small stones.	Severe: small stones.	Severe: large stones, small stones.	Moderate: large stones.
183: Tulana	Severe: excess humus.	Severe: excess humus.	Severe: excess humus.	Severe: excess humus.
184: Tulana Variant	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.
185: Tulebasin	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.
186: Zanbur	Slight	Slight	Moderate: small stones.	Slight.
187: Zuman	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
188: Zuman	Severe: ponding, excess sodium, excess salt.	Severe: ponding, excess sodium, excess salt.	Severe: ponding, excess sodium, excess salt.	Severe: ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WILDLIFE HABITAT

(Ratings in the N columns are for nonirrigated areas; those in the I columns are for irrigated areas. See text for definitions of "well suited," "suited," "poorly suited," and "unsuited." Absence of an entry indicates that the soil was not rated)

Map symbol and soil name	Elements of wildlife habitat											
	Grain and seed crops		Grasses and legumes		Wild herbaceous plants	Desertic herbaceous plants	Shrubs and vines	Desertic shrubs	Riparian shrubs and trees	Hardwood trees	Coniferous trees	Nonsaline wetland plants
	N	I	N	I								
101: Avis	---	---	---	---	Well suited.	---	Suited	---	Well suited.	Well suited.	Well suited	---
102: Capjac	---	Well suited.	Well suited.	Well suited.	Poorly suited.	---	---	---	Suited	---	---	Suited.
103: Capjac	---	---	---	---	---	---	---	---	Well suited.	---	---	Well suited.
104: Capona	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
105*:												
Capona	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
Rock outcrop.												
106: Dehill	---	Well suited.	---	Well suited.	Suited	Well suited.	---	Well suited.	---	---	Suited	---
107: Dehill	---	Suited	---	Well suited.	Suited	Well suited.	---	Well suited.	---	---	Suited	---
108: Demox	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Suited	---
109*:												
Demox	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Suited	---
Rubble land.												
110: Doel	---	Suited	---	---	Suited	Well suited.	---	Suited	---	---	Poorly suited.	---
111: Dotta	Well suited.	Well suited.	Well suited.	Well suited.	Well suited.	Well suited.	---	Well suited.	---	Well suited.	Well suited.	---
112*:												
Dunnlake	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Elements of wildlife habitat: Grain and seed crops, N	Grain and seed crops, I	Grasses and legumes, N	Grasses and legumes, I	Wild herbaceous plants	Desertic herbaceous plants	Shrubs and vines	Desertic shrubs	Riparian shrubs and trees	Hardwood trees	Coniferous trees	Nonsaline wetland plants
112*:												
Bucklake	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
113*:												
Dunnlake	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
Bucklake	---	---	---	---	Suited.	Well suited.	---	Well suited.	---	---	Poorly suited.	---
114*:												
Dunnlake	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
Bucklake	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
Lequieu	---	---	---	---	Poorly suited.	Poorly suited.	---	Suited	---	---	---	---
115*:												
Dunnlake	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
Lequieu	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	---	---
116*:												
Dunnlake	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
Rangee	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
117 Eastable	---	Well suited.	---	Well suited.	Suited	Well suited.	---	Well suited.	---	---	Suited	---
118*:												
Eastable	---	Well suited.	---	Well suited.	Suited	Well suited.	---	Well suited.	---	---	Suited	---
Hedox	---	Suited	---	Suited	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
119 Esro	---	---	---	---	Poorly suited.	---	---	---	Well suited.	---	---	Well suited.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Elements of wildlife habitat: Grain and seed crops N	Grain and seed crops I	Grasses and legumes N	Grasses and legumes I	Wild herbaceous plants	Desertic herbaceous plants	Shrubs and vines	Desertic shrubs	Riparian shrubs and trees	Hardwood trees	Coniferous trees	Nonsaline wetland plants
120-----------------Esro	---	---	---	---	Poorly suited.	---	---	---	Suited	---	---	Suited.
121-----------------Forbar	---	Suited	Suited	Suited	Poorly suited.	---	---	---	Well suited.	---	---	Well suited.
122-----------------Fordney	---	Well suited.	---	Well suited.	Suited	Well suited.	---	Well suited.	---	---	Suited	---
123-----------------Fordney	---	Well suited.	---	Well suited.	Suited	Well suited.	---	Well suited.	---	---	Suited	---
124-----------------Fordney	---	Well suited.	---	Well suited.	Suited	Well suited.	---	Unsuited	Suited	---	Suited	---
125*:												
Fredonyer----------	---	---	---	---	Suited	Suited	---	Well suited.	Poorly suited.	---	Poorly suited.	---
Mahogan------------	---	---	---	---	Suited	Well suited.	---	Well suited.	Unsuited	---	Suited	---
126*:												
Fredonyer----------	---	---	---	---	Suited	Suited	---	Well suited.	Poorly suited.	---	Poorly suited.	---
Rock outcrop.												
127*, 128*:												
Hedox--------------	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
Porterfield--------	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
129*:												
Hedox--------------	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
Porterfield--------	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
130*:												
Inlow--------------	---	Unsuited	---	Poorly suited.	Unsuited	Suited	---	Unsuited	---	---	---	Poorly suited.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Elements of wildlife habitat: Grain and seed crops, N	Grain and seed crops, I	Grasses and legumes, N	Grasses and legumes, I	Wild herbaceous plants	Desertic herbaceous plants	Shrubs and vines	Desertic shrubs	Riparian shrubs and trees	Hardwood trees	Coniferous trees	Nonsaline wetland plants
130*:												
Modoc	---	Suited	---	Well suited.	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
131*:												
Inlow	---	Unsuited	---	Poorly suited.	Unsuited	Suited	---	Unsuited	---	---	---	Poorly suited.
Ocho	---	Unsuited	---	Unsuited	Unsuited	Poorly suited.	---	Unsuited	---	---	---	Well suited.
132*:												
Inlow	---	Unsuited	---	Poorly suited.	Unsuited	Suited	---	Unsuited	---	---	---	Poorly suited.
Ocho	---	Unsuited	---	Unsuited	---	Poorly suited.	---	Unsuited	---	---	---	Well suited.
Modoc	---	Suited	---	Well suited.	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
133, 134 Kalo	---	---	---	---	Suited	---	Poorly suited.	---	Poorly suited.	Poorly suited.	Poorly suited.	---
135*:												
Karoc	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	---	---
Rock outcrop.												
136 Laki	---	Suited	---	Well suited.	Suited	Well suited.	---	Well suited.	Poorly suited.	---	---	Poorly suited.
137*:												
Laki	---	Suited	---	Well suited.	Suited	Well suited.	---	Well suited.	Poorly suited.	---	---	Poorly suited.
Henley	---	Unsuited	---	Unsuited	Unsuited	---	---	Unsuited	---	---	---	Suited.
138 Lalos	---	Suited	---	Suited	Poorly suited.	Suited	---	Suited	---	---	---	---
139*:												
Lalos	---	Suited	---	Suited	Poorly suited.	Suited	---	Suited	---	---	---	---

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Elements of wildlife habitat: Grain and seed crops N	Grain and seed crops I	Grasses and legumes N	Grasses and legumes I	Wild herbaceous plants	Desertic herbaceous plants	Shrubs and vines	Desertic shrubs	Riparian shrubs and trees	Hardwood trees	Coniferous trees	Nonsaline wetland plants
139*: Blownout land.												
140: Lamath	---	Well suited.	Suited	Well suited.	Poorly suited.	---	---	---	Well suited.	---	---	Well suited.
141, 142: Leavers	---	Well suited.	---	Well suited.	Suited	Well suited.	---	Well suited.	Suited	---	Suited	---
143: Lequieu	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	---	---
144*:												
Lequieu	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	---	---
Adieux	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
145*:												
Lorella	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
Fiddler	---	---	---	---	Suited	Suited	---	Suited	---	---	Poorly suited.	---
146*:												
Madeline	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
Capona	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
147*:												
Mahogan	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
Fredonyer	---	---	---	---	Suited	Suited	---	Well suited.	---	---	Poorly suited.	---
148: Medford	Well suited.	Well suited.	Well suited.	Well suited.	Well suited.	---	Well suited.	Well suited.	---	---	Well suited.	---
149: Modoc	---	Suited	---	Well suited.	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Elements of wildlife habitat: Grain and seed crops		Grasses and legumes		Wild herbaceous plants	Desertic herbaceous plants	Shrubs and vines	Desertic shrubs	Riparian shrubs and trees	Hardwood trees	Coniferous trees	Non-saline wetland plants
	N	I	N	I								
150----------------- Modoc	---	Suited	---	Well suited.	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
151*, 152*:												
Mojo---------------	---	---	---	---	Well suited.	---	Well suited.	---	---	---	Poorly suited.	---
Pinehurst----------	---	---	---	---	Well suited.	---	Well suited.	---	---	---	Suited	---
153----------------- Mudco	---	Poorly suited.	---	Poorly suited.	Poorly suited.	---	---	Suited	---	---	---	---
154, 155------------ Munnell	---	Well suited.	---	Well suited.	Suited	Well suited.	---	Well suited.	Unsuited	---	Well suited.	---
156----------------- Ocho Variant	---	Unsuited	---	Unsuited	Unsuited	Poorly suited.	---	Unsuited	---	---	---	Well suited.
157----------------- Orset	---	---	---	---	Well suited.	---	Well suited.	---	Unsuited	Well suited.	Well suited.	---
158*:												
Pinehurst----------	---	---	---	---	Well suited.	---	Well suited.	---	Unsuited	Suited	Suited	---
Kalo---------------	---	---	---	---	Suited	---	Poorly suited.	---	Unsuited	Poorly suited.	Poorly suited.	---
159----------------- Pit	Suited	Well suited.	Well suited.	Well suited.	Well suited.	---	---	---	Poorly suited.	---	---	Unsuited.
160----------------- Podus	---	Poorly suited.	---	Poorly suited.	Poorly suited.	---	---	---	Suited	---	---	Suited.
161----------------- Poe	---	Suited	---	Suited	Suited	Well suited.	---	Suited	Suited	---	---	Suited.
162----------------- Poman	---	Suited	---	Suited	Suited	Well suited.	---	Suited	---	---	---	---
163*:												
Rangee Variant-----	---	Poorly suited.	---	Poorly suited.	Poorly suited.	Suited	---	---	---	---	---	Well suited.
Dotta--------------	Suited	Well suited.	Well suited.	Well suited.	Well suited.	Well suited.	---	Well suited.	---	Well suited.	Well suited.	---

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Elements of wildlife habitat: Grain and seed crops, N	Grain and seed crops, I	Grasses and legumes, N	Grasses and legumes, I	Wild herbaceous plants	Desertic herbaceous plants	Shrubs and vines	Desertic shrubs	Riparian shrubs and trees	Hardwood trees	Coniferous trees	Nonsaline wetland plants
164, 165 Rojo	---	Suited	---	Suited	Suited	Suited	---	Suited	---	---	Poorly suited.	---
166*. Rubble land												
167*:												
Salisbury	---	---	---	---	Suited	Suited	---	Well suited.	---	---	Poorly suited.	---
Denbar	---	---	---	---	Well suited.	Well suited.	---	Well suited.	---	---	Poorly suited.	---
168*:												
Searles	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
Dunnlake	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
169*:												
Searles	---	---	---	---	Poorly suited.	Well suited.	---	Well suited.	---	---	Poorly suited.	---
Dunnlake	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
170*:												
Searles	---	---	---	---	Poorly suited.	Well suited.	---	Well suited.	---	---	Poorly suited.	---
Orhood	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
171*:												
Searles	---	---	---	---	Poorly suited.	Well suited.	---	Well suited.	---	---	Poorly suited.	---
Orhood	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
172*:												
Searles	---	---	---	---	Poorly suited.	Well suited.	---	Well suited.	---	---	Poorly suited.	---
Rubble land.												

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Elements of wildlife habitat: Grain and seed crops N	Grain and seed crops I	Grasses and legumes N	Grasses and legumes I	Wild herbaceous plants	Desertic herbaceous plants	Shrubs and vines	Desertic shrubs	Riparian shrubs and trees	Hardwood trees	Coniferous trees	Nonsaline wetland plants
173*:												
Searles	---	---	---	---	Poorly suited.	Well suited.	---	Well suited.	---	---	Poorly suited.	---
Truax	---	Well suited.	---	Well suited.	Well suited.	Well suited.	---	Well suited.	---	---	Suited	---
Orhood	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
174 Searle Variant	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Poorly suited.	---
175, 176 Sheld	---	---	---	---	Well suited.	---	Well suited.	---	Unsuited	Well suited.	Well suited.	---
177 Snell	---	---	---	---	Suited	Suited	Suited	Suited	---	---	Poorly suited.	---
178 Stukel	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
179*:												
Stukel	---	---	---	---	Poorly suited.	Suited	---	Suited	---	---	Unsuited	---
Capona	---	---	---	---	Suited	Well suited.	---	Well suited.	---	---	Suited	---
180 Teeters	---	Well suited.	Well suited.	Well suited.	Poorly suited.	---	---	---	---	---	---	Suited.
181 Truax	---	Well suited.	Suited	Well suited.	Well suited.	Well suited.	---	Well suited.	---	---	Suited	---
182*:												
Truax	---	Well suited.	---	Well suited.	Suited	Well suited.	---	Well suited.	---	---	Suited	---
Searles	---	---	---	---	Poorly suited.	Well suited.	---	Well suited.	---	---	Poorly suited.	---
183 Tulana	---	Well suited.	Well suited.	Well suited.	Poorly suited.	---	---	---	Suited	---	---	Suited.
184 Tulana Variant	---	---	---	---	Poorly suited.	---	---	---	---	---	---	Well suited.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Elements of wildlife habitat											
	Grain and seed crops		Grasses and legumes		Wild herbaceous plants	Desertic herbaceous plants	Shrubs and vines	Desertic shrubs	Riparian shrubs and trees	Hardwood trees	Coniferous trees	Non-saline wetland plants
	N	I	N	I								
185: Tulebasin	---	Well suited.	Well suited.	Well suited.	Poorly suited.	Poorly suited.	---	---	Suited	---	---	Suited.
186: Zanbur	---	Suited	---	Well suited.	---	Well suited.	---	---	Suited	---	---	Poorly suited.
187: Zuman	---	Poorly suited.	---	Suited	Poorly suited.	---	---	---	Suited	---	---	Well suited.
188: Zuman	---	---	---	---	Poorly suited.	---	---	---	Well suited.	---	---	Well suited.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
101 Avis	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
102 Capjac	Severe: wetness.	Severe: flooding.	Severe: flooding.	Moderate: low strength, wetness, flooding.	Moderate: wetness.
103 Capjac	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
104 Capona	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
105*:					
Capona	Severe: depth to rock.	Moderate: depth to rock, large stones.	Moderate: depth to rock, large stones.	Moderate: depth to rock, frost action.	Severe: large stones.
Rock outcrop.					
106 Dehill	Slight	Slight	Slight	Moderate: frost action.	Slight.
107 Dehill	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
108 Demox	Moderate: large stones, slope.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Moderate: large stones, slope.
109*:					
Demox	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
Rubble land.					
110 Doel	Severe: cemented pan, cutbanks cave.	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan, frost action.	Moderate: cemented pan.
111 Dotta	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
112*:					
Dunnlake	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, low strength.	Severe: large stones, depth to rock.

See footnote at end of table.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
112*:					
Bucklake	Severe: depth to rock.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Severe: large stones.
113*:					
Dunnlake	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: large stones, slope, depth to rock.
Bucklake	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
114*:					
Dunnlake	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, low strength.	Severe: large stones, depth to rock.
Bucklake	Severe: depth to rock.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: depth to rock.
Lequieu	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.
115*:					
Dunnlake	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, low strength.	Severe: large stones, depth to rock.
Lequieu	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.
116*:					
Dunnlake	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, low strength.	Severe: depth to rock.
Rangee	Severe: depth to rock, cemented pan.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: large stones, depth to rock.
117 Eastable	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: frost action, shrink-swell.	Slight.
118*:					
Eastable	Slight	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Slight.
Hedox	Moderate: depth to rock.	Slight	Moderate: slope.	Moderate: frost action.	Moderate: depth to rock.

See footnote at end of table.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
119----------- Esro	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness, flooding.
120----------- Esro	Severe: wetness.	Severe: flooding.	Severe: flooding.	Severe: frost action.	Slight.
121----------- Forbar	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, droughty.
122----------- Fordney	Severe: cutbanks cave.	Slight-----------	Slight-----------	Slight-----------	Slight.
123----------- Fordney	Severe: cutbanks cave.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
124----------- Fordney	Severe: cutbanks cave, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty.
125*:					
Fredonyer--------	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
Mahogan----------	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
126*:					
Fredonyer--------	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
Rock outcrop.					
127*:					
Hedox------------	Moderate: depth to rock, slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, depth to rock.
Porterfield------	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: depth to rock.
128*:					
Hedox------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Porterfield------	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
129*:					
Hedox------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.

See footnote at end of table.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
129*:					
Porterfield------	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
130*:					
Inlow------------	Severe: cemented pan, cutbanks cave.	Moderate: shrink-swell, cemented pan.	Moderate: shrink-swell, cemented pan.	Severe: low strength.	Severe: excess sodium.
Modoc------------	Severe: cemented pan, cutbanks cave.	Moderate: shrink-swell, cemented pan.	Moderate: shrink-swell, cemented pan.	Moderate: cemented pan, shrink-swell.	Moderate: cemented pan.
131*:					
Inlow------------	Severe: cemented pan, cutbanks cave.	Moderate: shrink-swell, cemented pan.	Moderate: shrink-swell, cemented pan.	Severe: low strength.	Severe: excess sodium.
Ocho-------------	Severe: cemented pan, cutbanks cave, ponding.	Severe: ponding, cemented pan.	Severe: ponding, cemented pan.	Severe: cemented pan, ponding.	Severe: excess sodium, ponding, cemented pan.
132*:					
Inlow------------	Severe: cemented pan, cutbanks cave.	Moderate: shrink-swell, cemented pan.	Moderate: shrink-swell, cemented pan.	Severe: low strength.	Severe: excess sodium.
Ocho-------------	Severe: cemented pan, cutbanks cave, ponding.	Severe: ponding, cemented pan.	Severe: ponding, cemented pan.	Severe: cemented pan, ponding.	Severe: excess sodium, ponding, cemented pan.
Modoc------------	Severe: cemented pan, cutbanks cave.	Moderate: shrink-swell, cemented pan.	Moderate: shrink-swell, cemented pan.	Moderate: cemented pan, shrink-swell.	Moderate: cemented pan.
133, 134---------- Kalo	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
135*:					
Karoc------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Rock outcrop.					
136--------------- Laki	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
137*:					
Laki-------------	Severe: wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding.	Severe: excess salt, droughty.

See footnote at end of table.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
137*:					
Henley	Severe: cemented pan, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: frost action.	Moderate: excess salt, wetness, cemented pan.
138 Lalos	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Severe: excess sodium.
139*:					
Lalos	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.	Severe: excess sodium.
Blownout land.					
140 Lamath	Severe: cutbanks cave, excess humus, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: frost action.	Moderate: wetness.
141, 142 Leavers	Severe: cutbanks cave.	Slight	Slight	Moderate: frost action.	Moderate: droughty.
143 Lequieu	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.
144*:					
Lequieu	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.
Adieux	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Moderate: shrink-swell, depth to rock.	Moderate: depth to rock, frost action, shrink-swell.	Moderate: large stones, depth to rock.
145*:					
Lorella	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, shrink-swell, slope.	Severe: large stones, slope, depth to rock.
Fiddler	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: large stones, slope.
146*:					
Madeline	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: large stones, depth to rock.
Capona	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: large stones.

See footnote at end of table.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
147*:					
Mahogan	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fredonyer	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
148 Medford	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: large stones.
149 Modoc	Severe: cemented pan, cutbanks cave.	Moderate: shrink-swell, cemented pan.	Moderate: shrink-swell, cemented pan.	Moderate: cemented pan, shrink-swell.	Moderate: cemented pan.
150 Modoc	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Moderate: shrink-swell, cemented pan.	Moderate: cemented pan, shrink-swell.	Moderate: cemented pan.
151*:					
Mojo	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope, depth to rock.
Pinehurst	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones.
152*:					
Mojo	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Pinehurst	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
153 Mudco	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.
154, 155 Munnell	Severe: cutbanks cave.	Slight	Slight	Moderate: frost action.	Moderate: small stones.
156 Ocho Variant	Severe: cemented pan, ponding.	Severe: ponding, shrink-swell, cemented pan.	Severe: ponding, shrink-swell, cemented pan.	Severe: cemented pan, shrink-swell, low strength.	Severe: excess sodium, ponding, cemented pan.
157 Orset	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
158*:					
Pinehurst	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones.
Kalo	Severe: depth to rock, large stones.	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: large stones.

See footnote at end of table.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
159--------------- Pit	Severe: cutbanks cave.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: too clayey.
160--------------- Podus	Severe: cemented pan, wetness.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.
161--------------- Poe	Severe: cutbanks cave, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, cemented pan.
162--------------- Poman	Severe: cemented pan, cutbanks cave.	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: droughty, cemented pan.
163*:					
Rangee Variant---	Severe: cemented pan, ponding.	Severe: ponding, shrink-swell, cemented pan.	Severe: ponding, shrink-swell, cemented pan.	Severe: cemented pan, shrink-swell, low strength.	Severe: ponding, cemented pan.
Dotta------------	Slight-----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
164--------------- Rojo	Moderate: depth to rock, cemented pan.	Slight-----------	Slight-----------	Moderate: frost action.	Moderate: depth to rock.
165--------------- Rojo	Moderate: depth to rock, cemented pan.	Slight-----------	Moderate: slope.	Moderate: frost action.	Moderate: depth to rock.
166*. Rubble land					
167*:					
Salisbury--------	Severe: cemented pan.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: large stones.
Denbar-----------	Moderate: cemented pan, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: large stones.
168*, 169*:					
Searles----------	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: small stones, large stones.
Dunnlake---------	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: large stones, slope, depth to rock.
170*, 171*:					
Searles----------	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: small stones, large stones.

See footnote at end of table.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
170*, 171*:					
Orhood	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: large stones, slope, depth to rock.
172*:					
Searles	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: small stones, large stones.
Rubble land.					
173*:					
Searles	Severe: depth to rock, large stones.	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: small stones, large stones.
Truax	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, slope.
Orhood	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: large stones, depth to rock.
174 Searles Variant	Moderate: depth to rock, too clayey, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, large stones.	Moderate: low strength, frost action, shrink-swell.	Severe: small stones, large stones.
175, 176 Sheld	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
177 Snell	Severe: depth to rock, large stones, slope.	Severe: shrink-swell, slope, large stones.	Severe: shrink-swell, slope, large stones.	Severe: low strength, slope, shrink-swell.	Severe: large stones, slope.
178 Stukel	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
179*:					
Stukel	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Capona	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
180 Teeters	Severe: excess humus, wetness.	Severe: flooding, low strength.	Severe: flooding, low strength.	Severe: low strength, frost action.	Severe: excess sodium.
181 Truax	Slight	Slight	Slight	Moderate: frost action.	Moderate: large stones.

See footnote at end of table.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
182*:					
Truax	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: large stones.
Searles	Severe: depth to rock, large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: small stones, large stones.
183 Tulana	Severe: cutbanks cave, excess humus, wetness.	Severe: low strength.	Severe: low strength.	Severe: low strength, frost action.	Slight.
184 Tulana Variant	Severe: excess humus, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, wetness.	Severe: wetness, excess humus.
185 Tulebasin	Severe: wetness.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Moderate: wetness.
186 Zanbur	Moderate: wetness.	Slight	Slight	Severe: low strength.	Slight.
187 Zuman	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.
188 Zuman	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess salt, excess sodium, ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
101 Avis	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
102 Capjac	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
103 Capjac	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: hard to pack, ponding.
104 Capona	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, large stones, slope.
105*:					
Capona	Severe: depth to rock.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock, large stones.
Rock outcrop.					
106 Dehill	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
107 Dehill	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
108 Demox	Moderate: slope, large stones.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
109*:					
Demox	Severe: slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Rubble land.					
110 Doel	Severe: cemented pan, poor filter.	Severe: seepage, cemented pan.	Severe: cemented pan, too sandy.	Slight	Poor: cemented pan.
111 Dotta	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Good.
112*:					
Dunnlake	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.

See footnotes at end of table.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
112*:					
Bucklake	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock, hard to pack, small stones.
113*:					
Dunnlake	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Bucklake	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, hard to pack, slope.
114*:					
Dunnlake	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Bucklake	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock, hard to pack.
Lequieu	Severe: depth to rock.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock.
115*:					
Dunnlake	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Lequieu	Severe: depth to rock.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock.
116*:					
Dunnlake	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Rangee	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Slight	Poor: depth to rock, hard to pack.
117 Eastable	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
118*:					
Eastable	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.

See footnotes at end of table.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
118*:					
Hedox	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock.
119 Esro	Severe: flooding, wetness, percs slowly.	Severe: flooding,** wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
120 Esro	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
121 Forbar	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness.
122 Fordney	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
123 Fordney	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
124 Fordney	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
125*:					
Fredonyer	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, large stones, slope.
Mahogan	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
126*:					
Fredonyer	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, large stones, slope.
Rock outcrop.					
127*:					
Hedox	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.
Porterfield	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.

See footnotes at end of table.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
128*:					
Hedox	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
Porterfield	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
129*:					
Hedox	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: depth to rock, large stones, slope.
Porterfield	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
130*:					
Inlow	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, cemented pan, wetness.	Severe: cemented pan, seepage, wetness.	Severe: cemented pan, seepage, wetness.	Poor: cemented pan.
Modoc	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan, too sandy.	Slight	Poor: cemented pan.
131*:					
Inlow	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, cemented pan, wetness.	Severe: cemented pan, seepage, wetness.	Severe: cemented pan, seepage, wetness.	Poor: cemented pan.
Ocho	Severe: cemented pan, ponding.	Severe: seepage, cemented pan, ponding.	Severe: cemented pan, seepage, ponding.	Severe: cemented pan, ponding.	Poor: cemented pan, ponding.
132*:					
Inlow	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, cemented pan, wetness.	Severe: cemented pan, seepage, wetness.	Severe: cemented pan, seepage, wetness.	Poor: cemented pan.
Ocho	Severe: cemented pan, ponding.	Severe: seepage, cemented pan, ponding.	Severe: cemented pan, seepage, ponding.	Severe: cemented pan, ponding.	Poor: cemented pan, ponding.
Modoc	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan, too sandy.	Slight	Poor: cemented pan.
133, 134 Kalo	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, large stones, slope.

See footnotes at end of table.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
135*:					
Karoc	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Rock outcrop.					
136 Laki	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
137*:					
Laki	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Henley	Severe: cemented pan, wetness.	Severe: seepage, cemented pan, wetness.	Severe: cemented pan, wetness.	Severe: wetness.	Poor: cemented pan, wetness.
138 Lalos	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
139*:					
Lalos	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Blownout land.					
140 Lamath	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
141 Leavers	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
142 Leavers	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight	Poor: seepage, too sandy, small stones.
143 Lequieu	Severe: depth to rock.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock.
144*:					
Lequieu	Severe: depth to rock.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock.
Adieux	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.

See footnotes at end of table.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
145*:					
Lorella	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, small stones.
Fiddler	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, large stones.
146*:					
Madeline	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Capona	Severe: depth to rock.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock, large stones.
147*:					
Mahogan	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Fredonyer	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, large stones, slope.
148 Medford	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
149 Modoc	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan, too sandy.	Slight	Poor: cemented pan.
150 Modoc	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: cemented pan.
151*:					
Mojo	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Pinehurst	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: small stones.
152*:					
Mojo	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Pinehurst	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.

See footnotes at end of table.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
153----------------- Mudco	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight-----------	Poor: cemented pan.
154----------------- Munnell	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight-----------	Poor: seepage, too sandy, small stones.
155----------------- Munnell	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
156----------------- Ocho Variant	Severe: cemented pan, ponding.	Severe: cemented pan, ponding.	Severe: cemented pan, ponding.	Severe: ponding.	Poor: cemented pan, hard to pack, ponding.
157----------------- Orset	Severe: percs slowly.	Severe: seepage.	Slight-----------	Slight-----------	Fair: small stones.
158*:					
Pinehurst----------	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: small stones.
Kalo---------------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock, large stones.
159----------------- Pit	Severe: flooding, percs slowly.	Severe: flooding.**	Severe: flooding, wetness, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
160----------------- Podus	Severe: cemented pan, wetness.	Severe: seepage, cemented pan, wetness.	Severe: cemented pan, seepage, wetness.	Severe: cemented pan, seepage.	Poor: cemented pan.
161----------------- Poe	Severe: cemented pan, wetness.	Severe: seepage, cemented pan, wetness.	Severe: seepage, wetness.	Severe: cemented pan, seepage, wetness.	Poor: cemented pan.
162----------------- Poman	Severe: cemented pan, poor filter.	Severe: seepage, cemented pan.	Severe: cemented pan, too sandy.	Slight-----------	Poor: cemented pan, seepage, too sandy.
163*:					
Rangee Variant-----	Severe: cemented pan, ponding.	Severe: seepage, cemented pan, ponding.	Severe: cemented pan, seepage, ponding.	Severe: cemented pan, seepage, ponding.	Poor: cemented pan, ponding.
Dotta--------------	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Slight-----------	Good.

See footnotes at end of table.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
164, 165------------ Rojo	Severe: depth to rock, cemented pan.	Severe: seepage, depth to rock, cemented pan.	Severe: depth to rock.	Slight-----------	Poor: depth to rock.
166*. Rubble land					
167*:					
Salisbury----------	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan, too clayey.	Severe: cemented pan.	Poor: cemented pan, too clayey, hard to pack.
Denbar-------------	Severe: percs slowly.	Severe: seepage.	Severe: cemented pan, seepage, too clayey.	Severe: seepage.	Poor: too clayey.
168*, 169*:					
Searles------------	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: depth to rock, small stones, slope.
Dunnlake-----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
170*, 171*:					
Searles------------	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: depth to rock, small stones, slope.
Orhood-------------	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, large stones, slope.
172*:					
Searles------------	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: depth to rock, small stones, slope.
Rubble land.					
173*:					
Searles------------	Severe: depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Moderate: slope.	Poor: depth to rock, small stones.
Truax--------------	Severe: percs slowly.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Fair: slope.

See footnotes at end of table.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
173*:					
Orhood	Severe: depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock, large stones.
174 Searles Variant	Severe: percs slowly.	Severe: large stones.	Severe: depth to rock, large stones.	Slight	Poor: hard to pack, small stones.
175, 176 Sheld	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
177 Snell	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
178 Stukel	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
179*:					
Stukel	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Capona	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, small stones, slope.
180 Teeters	Severe: wetness, percs slowly.	Moderate: excess humus.	Severe: wetness, excess humus, excess sodium.	Severe: wetness.	Poor: hard to pack, excess sodium.
181 Truax	Severe: percs slowly.	Severe: seepage.	Slight	Slight	Good.
182*:					
Truax	Severe: percs slowly.	Severe: seepage.	Slight	Slight	Good.
Searles	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Slight	Poor: depth to rock, small stones.
183 Tulana	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, excess humus.	Severe: wetness.	Poor: hard to pack.
184 Tulana Variant	Severe: wetness.	Severe: seepage, excess humus, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.

See footnotes at end of table.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
185----------------- Tulebasin	Severe: wetness.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: flooding, wetness.	Poor: too clayey, hard to pack.
186----------------- Zanbur	Severe: wetness.	Severe: seepage.	Moderate: wetness.	Slight-----------	Good.
187----------------- Zuman	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness.
188----------------- Zuman	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: too sandy, ponding, excess sodium.

* See description of the map unit for composition and behavior characteristics of the map unit.

** If floodwater does not enter or damage sewage lagoons because it moves at a low velocity and is less than 5 feet deep, disregard flooding.

TABLE 16.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
101 Avis	Fair: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
102 Capjac	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
103 Capjac	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
104 Capona	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
105*:				
Capona	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones.
Rock outcrop.				
106 Dehill	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones.
107 Dehill	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones, slope.
108 Demox	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
109*:				
Demox	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rubble land.				
110 Doel	Poor: cemented pan.	Probable	Improbable: too sandy.	Fair: cemented pan, small stones.
111 Dotta	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
112*:				
Dunnlake	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.

See footnote at end of table.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
112*:				
Bucklake	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
113*:				
Dunnlake	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Bucklake	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
114*:				
Dunnlake	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Bucklake	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Lequieu	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones.
115*:				
Dunnlake	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Lequieu	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones.
116*:				
Dunnlake	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Rangee	Poor: depth to rock, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
117 Eastable	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
118*:				
Eastable	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Hedox	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
119 Esro	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
120 Esro	Fair: wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
121 Forbar	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
122, 123 Fordney	Good	Probable	Improbable: too sandy.	Poor: too sandy.
124 Fordney	Fair: wetness.	Probable	Improbable: too sandy.	Poor: thin layer.
125*:				
Fredonyer	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Mahogan	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
126*:				
Fredonyer	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rock outcrop.				
127*:				
Hedox	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Porterfield	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
128*:				
Hedox	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Porterfield	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
129*:				
Hedox	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
Porterfield	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
130*:				
Inlow	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.

See footnote at end of table.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
130*:				
Modoc	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Fair: cemented pan, too clayey, small stones.
131*:				
Inlow	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
Ocho	Poor: cemented pan, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, wetness, excess sodium.
132*:				
Inlow	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
Ocho	Poor: cemented pan, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, wetness, excess sodium.
Modoc	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Fair: cemented pan, too clayey, small stones.
133 Kalo	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
134 Kalo	Poor: depth to rock, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
135*:				
Karoc	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop.				
136 Laki	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
137*:				
Laki	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
Henley	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Fair: cemented pan, excess salt, thin layer.
138 Lalos	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.

See footnote at end of table.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
139*:				
Lalos	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
Blownout land.				
140 Lamath	Fair: wetness.	Improbable: thin layer.	Improbable: too sandy.	Fair: thin layer.
141, 142 Leavers	Good	Probable	Probable	Poor: small stones, area reclaim.
143 Lequieu	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones.
144*:				
Lequieu	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones.
Adieux	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, large stones.
145*:				
Lorella	Poor: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, small stones.
Fiddler	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, slope.
146*:				
Madeline	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, small stones.
Capona	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones.
147*:				
Mahogan	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Fredonyer	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
148 Medford	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
149, 150 Modoc	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Fair: cemented pan, too clayey, small stones.
151*:				
Mojo	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Pinehurst	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
152*:				
Mojo	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Pinehurst	Fair: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
153 Mudco	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, small stones.
154, 155 Munnell	Good	Probable	Probable	Poor: small stones, area reclaim.
156 Ocho Variant	Poor: cemented pan, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, too clayey, wetness.
157 Orset	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
158*:				
Pinehurst	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Kalo	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones.
159 Pit	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
160 Podus	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan.
161 Poe	Fair: thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: cemented pan, too sandy, small stones.

See footnote at end of table.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
162 Poman	Poor: cemented pan.	Probable	Improbable: too sandy.	Fair: cemented pan, too sandy, thin layer.
163*:				
Rangee Variant	Poor: cemented pan, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, too clayey, wetness.
Dotta	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
164, 165 Rojo	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, cemented pan, small stones.
166*. Rubble land				
167*:				
Salisbury	Poor: cemented pan, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Denbar	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
168*:				
Searles	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Dunnlake	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
169*:				
Searles	Poor: depth to rock, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Dunnlake	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
170*:				
Searles	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Orhood	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: depth to rock, large stones, slope.

See footnote at end of table.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
171*:				
Searles	Poor: depth to rock, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Orhood	Poor: depth to rock, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: depth to rock, large stones, slope.
172*:				
Searles	Poor: depth to rock, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Rubble land.				
173*:				
Searles	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones.
Truax	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones, area reclaim, slope.
Orhood	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: depth to rock, large stones.
174 Searles Variant	Fair: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
175 Sheld	Fair: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
176 Sheld	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
177 Snell	Poor: depth to rock, low strength, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
178 Stukel	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.

See footnote at end of table.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
179*:				
Stukel	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Capona	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
180 Teeters	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, excess sodium.
181 Truax	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones, area reclaim.
182*:				
Truax	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones, area reclaim.
Searles	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones.
183 Tulana	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
184 Tulana Variant	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
185 Tulebasin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
186 Zanbur	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, excess salt.
187 Zuman	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
188 Zuman	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness, excess sodium.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
101: Avis	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
102: Capjac	Moderate: seepage.	Severe: piping, hard to pack, wetness.	Favorable	Wetness, erodes easily, excess salt.	Erodes easily, wetness.	Erodes easily.
103: Capjac	Moderate: seepage.	Severe: piping, hard to pack, ponding.	Ponding	Ponding, erodes easily, excess salt.	Erodes easily, ponding.	Wetness, erodes easily.
104: Capona	Severe: slope.	Severe: thin layer, piping, large stones.	Deep to water	Large stones, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
105*:						
Capona	Moderate: seepage, depth to rock.	Severe: thin layer, piping, large stones.	Deep to water	Large stones, depth to rock.	Large stones, depth to rock.	Large stones, depth to rock.
Rock outcrop.						
106: Dehill	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
107: Dehill	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, soil blowing.	Slope.
108: Demox	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
109*:						
Demox	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Rubble land.						
110: Doel	Severe: seepage.	Severe: thin layer.	Deep to water	Soil blowing, cemented pan.	Cemented pan, soil blowing.	Too arid, cemented pan.
111: Dotta	Severe: seepage.	Moderate: piping.	Deep to water	Soil blowing	Erodes easily, soil blowing.	Erodes easily.
112*:						
Dunnlake	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope.

See footnotes at end of table.

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
112*:						
Bucklake	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Too arid, large stones, slope.
113*:						
Dunnlake	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope.
Bucklake	Severe: slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, percs slowly.	Too arid, slope, depth to rock.
114*:						
Dunnlake	Severe: depth to rock.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Large stones, depth to rock.	Large stones.
Bucklake	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Depth to rock, percs slowly.	Too arid, depth to rock.
Lequieu	Severe: depth to rock.	Severe: thin layer, large stones.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Too arid, large stones.
115*:						
Dunnlake	Severe: depth to rock.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Large stones, depth to rock.	Large stones.
Lequieu	Severe: depth to rock.	Severe: thin layer, large stones.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Too arid, large stones.
116*:						
Dunnlake	Severe: depth to rock.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Rangee	Moderate: depth to rock, cemented pan.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock.	Depth to rock, cemented pan, percs slowly.	Too arid, depth to rock, cemented pan.
117 Eastable	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Too arid, erodes easily.
118*:						
Eastable	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Too arid, erodes easily.
Hedox	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Depth to rock	Too arid, depth to rock.
119 Esro	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
120 Esro	Moderate: seepage.	Severe: piping.	Frost action	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.

See footnotes at end of table.

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
121---------------Forbar	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy.	Wetness, droughty.
122---------------Fordney	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Too arid, droughty.
123---------------Fordney	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Too arid, slope, droughty.
124---------------Fordney	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
125*:						
Fredonyer---------	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Mahogan----------	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
126*:						
Fredonyer---------	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
127*, 128*:						
Hedox------------	Severe: slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Too arid, slope, depth to rock.
Porterfield------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Too arid, slope, depth to rock.
129*:						
Hedox------------	Severe: slope.	Severe: thin layer, piping, large stones.	Deep to water	Large stones, depth to rock, slope.	Slope, large stones, depth to rock.	Too arid, large stones, slope.
Porterfield------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Too arid, slope, depth to rock.
130*:						
Inlow------------	Severe: seepage, cemented pan.	Severe: excess sodium.	Deep to water	Percs slowly, excess sodium, erodes easily.	Cemented pan, erodes easily, percs slowly.	Too arid, erodes easily, cemented pan.
Modoc------------	Moderate: seepage, cemented pan.	Severe: thin layer.	Deep to water	Cemented pan---	Cemented pan---	Too arid, cemented pan.

See footnotes at end of table.

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
131*:						
Inlow	Severe: seepage, cemented pan.	Severe: excess sodium.	Deep to water**	Percs slowly, excess sodium, erodes easily.	Cemented pan, erodes easily, percs slowly.	Too arid, erodes easily, cemented pan.
Ocho	Severe: cemented pan.	Severe: piping, ponding, excess sodium.	Ponding, percs slowly, cemented pan.	Ponding, soil blowing, excess sodium.	Cemented pan, erodes easily, ponding.	Too arid, wetness, excess sodium.
132*:						
Inlow	Severe: seepage, cemented pan.	Severe: excess sodium.	Deep to water**	Percs slowly, excess sodium, erodes easily.	Cemented pan, erodes easily, percs slowly.	Too arid, erodes easily, cemented pan.
Ocho	Severe: cemented pan.	Severe: piping, ponding, excess sodium.	Ponding, percs slowly, cemented pan.	Ponding, soil blowing, excess sodium.	Cemented pan, erodes easily, ponding.	Too arid, wetness, excess sodium.
Modoc	Moderate: seepage, cemented pan.	Severe: thin layer.	Deep to water	Cemented pan	Cemented pan	Too arid, cemented pan.
133, 134 Kalo	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
135*:						
Karoc	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones.	Too arid, large stones, slope.
Rock outcrop.						
136 Laki	Moderate: seepage.	Severe: piping.	Deep to water**	Excess salt	Favorable	Excess salt.
137*:						
Laki	Moderate: seepage.	Severe: piping.	Excess salt	Wetness, droughty.	Wetness, soil blowing.	Excess salt, droughty.
Henley	Severe: seepage.	Severe: piping, wetness.	Cemented pan, frost action.	Wetness, cemented pan.	Cemented pan, erodes easily, wetness.	Too arid, wetness, excess salt.
138 Lalos	Severe: slope.	Severe: piping, excess sodium.	Deep to water	Soil blowing, slope, erodes easily.	Slope, erodes easily, soil blowing.	Too arid, slope, erodes easily.
139*:						
Lalos	Moderate: seepage, slope.	Severe: piping, excess sodium.	Deep to water	Soil blowing, slope, erodes easily.	Erodes easily, soil blowing.	Too arid, erodes easily.
Blownout land.						
140 Lamath	Severe: seepage.	Severe: seepage, piping, wetness.	Frost action, cutbanks cave.	Wetness, erodes easily.	Erodes easily, wetness, too sandy.	Wetness, erodes easily.

See footnotes at end of table.

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
141, 142----------Leavers	Severe: seepage.	Severe: seepage.	Deep to water**	Droughty, soil blowing.	Too sandy, soil blowing.	Too arid, droughty.
143---------------Lequieu	Severe: depth to rock.	Severe: thin layer, large stones.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Too arid, large stones.
144*:						
Lequieu----------	Severe: depth to rock.	Severe: thin layer, large stones.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Too arid, large stones.
Adieux-----------	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Depth to rock	Depth to rock	Depth to rock.
145*:						
Lorella----------	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Fiddler----------	Severe: slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
146*:						
Madeline---------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Capona-----------	Severe: slope.	Severe: thin layer, piping, large stones.	Deep to water	Large stones, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
147*:						
Mahogan----------	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Fredonyer--------	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
148---------------Medford	Slight---------	Slight---------	Deep to water	Favorable------	Favorable------	Favorable.
149---------------Modoc	Moderate: seepage, cemented pan.	Severe: thin layer.	Deep to water	Cemented pan---	Cemented pan---	Too arid, cemented pan.
150---------------Modoc	Moderate: cemented pan, slope.	Severe: thin layer.	Deep to water	Slope, cemented pan.	Cemented pan---	Too arid, cemented pan.
151*, 152*:						
Mojo-------------	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Pinehurst--------	Severe: slope.	Moderate: thin layer, large stones.	Deep to water	Slope, droughty.	Slope, large stones.	Large stones, slope, droughty.

See footnotes at end of table.

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
153-------------- Mudco	Severe: cemented pan.	Severe: thin layer.	Deep to water	Slope, cemented pan.	Cemented pan---	Too arid, cemented pan.
154, 155---------- Munnell	Severe: seepage.	Severe: seepage.	Deep to water**	Favorable------	Too sandy------	Too arid.
156-------------- Ocho Variant	Severe: cemented pan.	Severe: ponding, excess sodium.	Ponding, percs slowly, cemented pan.	Ponding, percs slowly, cemented pan.	Cemented pan, erodes easily, ponding.	Too arid, wetness, excess sodium.
157-------------- Orset	Moderate: slope.	Severe: piping.	Deep to water	Slope, droughty.	Favorable------	Droughty.
158*:						
Pinehurst--------	Severe: slope.	Moderate: thin layer, large stones.	Deep to water	Slope, droughty.	Slope, large stones.	Large stones, slope, droughty.
Kalo-------------	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
159-------------- Pit	Slight---------	Moderate: thin layer, hard to pack.	Deep to water**	Slow intake, percs slowly, flooding.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
160-------------- Podus	Severe: seepage, cemented pan.	Severe: piping.	Cemented pan---	Wetness, droughty, fast intake.	Cemented pan, wetness, soil blowing.	Droughty, cemented pan.
161-------------- Poe	Severe: seepage.	Severe: seepage, piping.	Cemented pan, cutbanks cave.	Wetness, droughty, fast intake.	Cemented pan, wetness, too sandy.	Droughty, cemented pan.
162-------------- Poman	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Cemented pan, too sandy, soil blowing.	Too arid, droughty, cemented pan.
163*:						
Rangee Variant---	Severe: seepage, cemented pan.	Severe: ponding.	Ponding, percs slowly, cemented pan.	Ponding, percs slowly, cemented pan.	Cemented pan, ponding.	Wetness, cemented pan, percs slowly.
Dotta------------	Severe: seepage.	Moderate: piping.	Deep to water	Soil blowing---	Erodes easily, soil blowing.	Erodes easily.
164-------------- Rojo	Severe: seepage.	Severe: thin layer.	Deep to water	Soil blowing, depth to rock.	Depth to rock, cemented pan.	Too arid, depth to rock.
165-------------- Rojo	Severe: seepage.	Severe: thin layer.	Deep to water	Slope, soil blowing, depth to rock.	Depth to rock, cemented pan.	Too arid, depth to rock.
166*. Rubble land						
167*:						
Salisbury--------	Moderate: cemented pan, slope.	Severe: thin layer.	Deep to water	Percs slowly, cemented pan.	Large stones, cemented pan.	Large stones.

See footnotes at end of table.

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
167*:						
Denbar	Severe: seepage.	Severe: thin layer.	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.
168*, 169*:						
Searles	Severe: slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Too arid, large stones, slope.
Dunnlake	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope.
170*, 171*:						
Searles	Severe: slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Too arid, large stones, slope.
Orhood	Severe: depth to rock, slope.	Severe: thin layer, large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
172*:						
Searles	Severe: slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Too arid, large stones, slope.
Rubble land.						
173*:						
Searles	Severe: slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Too arid, large stones, slope.
Truax	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, soil blowing.	Too arid, slope.
Orhood	Severe: depth to rock, slope.	Severe: thin layer, large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
174 Searles Variant	Moderate: depth to rock.	Severe: large stones.	Deep to water	Large stones, droughty.	Large stones, percs slowly.	Too arid, large stones, droughty.
175, 176 Sheld	Severe: slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
177 Snell	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
178 Stukel	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.

See footnotes at end of table.

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
179*:						
Stukel	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Capona	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Too arid, slope, depth to rock.
180 Teeters	Slight	Severe: excess humus, hard to pack, excess sodium.	Percs slowly, frost action, excess salt.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Excess salt, excess sodium, erodes easily.
181 Truax	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Too arid.
182*:						
Truax	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Soil blowing	Too arid.
Searles	Moderate: seepage, depth to rock, slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Large stones, depth to rock.	Too arid, large stones.
183 Tulana	Moderate: seepage.	Severe: excess humus, hard to pack.	Frost action	Wetness	Erodes easily, wetness.	Erodes easily.
184 Tulana Variant	Severe: seepage.	Severe: piping, wetness.	Subsides	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
185 Tulebasin	Moderate: seepage.	Severe: hard to pack.	Favorable	Wetness, excess salt.	Wetness	Favorable.
186 Zanbur	Moderate: seepage.	Severe: piping.	Deep to water**	Soil blowing, excess salt.	Erodes easily, soil blowing.	Erodes easily.
187 Zuman	Severe: seepage.	Severe: seepage, piping, wetness.	Percs slowly, cutbanks cave, excess salt.	Wetness, fast intake, percs slowly.	Erodes easily, wetness, too sandy.	Wetness, excess salt, erodes easily.
188 Zuman	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, percs slowly, cutbanks cave.	Ponding, droughty.	Erodes easily, ponding, too sandy.	Wetness, excess salt, excess sodium.

* See description of the map unit for composition and behavior characteristics of the map unit.

** If the soil is irrigated and has a water table at a depth of 3 to 5 feet, other restrictive features may affect drainage.

TABLE 18.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
101-------------- Avis	0-9	Stony sandy loam	SM	A-2, A-4	10-25	80-95	75-95	40-60	30-50	15-20	NP-5
	9-60	Very gravelly loamy sand, very gravelly sand, very gravelly loamy fine sand.	GP-GM, GM	A-1	10-25	40-55	35-50	15-30	5-15	---	NP
102, 103--------- Capjac	0-26	Silt loam--------	ML, MH	A-5	0	100	100	90-100	70-90	40-60	NP-10
	26-60	Silt loam--------	ML, MH	A-5	0	100	100	90-100	70-90	40-60	NP-10
104-------------- Capona	0-10	Cobbly loam------	ML	A-4	20-45	80-95	75-90	70-80	50-65	25-35	NP-10
	10-34	Cobbly sandy clay loam, cobbly loam.	SM, SM-SC, ML, CL-ML	A-4, A-2	20-40	75-90	70-85	65-75	25-60	25-35	5-10
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
105*:											
Capona----------	0-10	Cobbly loam------	ML	A-4	20-45	80-95	75-90	70-80	50-65	25-35	NP-10
	10-34	Cobbly sandy clay loam, cobbly loam.	SM, SM-SC, ML, CL-ML	A-4, A-2	20-40	75-90	70-85	65-75	25-60	25-35	5-10
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
106, 107--------- Dehill	0-15	Fine sandy loam	SM	A-4	0-5	95-100	95-100	75-85	35-50	20-30	NP-5
	15-60	Fine sandy loam	SM, SM-SC	A-4	0-5	95-100	95-100	75-85	35-50	20-30	NP-10
108-------------- Demox	0-12	Stony sandy loam	SM	A-1, A-2	10-20	75-90	70-85	40-60	20-35	20-30	NP-5
	12-62	Very gravelly sandy loam.	SM, GM	A-1	15-30	50-65	45-60	25-40	10-25	20-30	NP-5
109*:											
Demox-----------	0-12	Very stony sandy loam.	SM	A-1, A-2	20-40	75-90	70-85	40-60	20-35	20-30	NP-5
	12-62	Very gravelly sandy loam.	SM, GM	A-1	15-30	50-65	45-60	25-40	10-25	20-30	NP-5
Rubble land.											
110-------------- Doel	0-14	Sandy loam-------	SM, SM-SC	A-2	0	90-100	85-100	55-70	25-35	20-30	NP-10
	14-21	Sandy loam-------	SM, SM-SC	A-2, A-4	0	90-100	85-100	60-75	30-40	20-30	---
	21-29	Sandy loam-------	SM, SM-SC	A-2	0	90-100	85-100	55-70	25-35	20-30	---
	29-48	Indurated--------	---	---	---	---	---	---	---	---	---
	48-60	Sand-------------	SM, SP-SM	A-1, A-2, A-3	0	90-100	85-100	45-65	5-15	---	NP
111-------------- Dotta	0-15	Sandy loam-------	SM	A-4	0	80-100	75-100	50-70	35-50	20-30	NP-5
	15-30	Loam-------------	CL-ML, ML	A-4	0	80-100	75-100	60-85	50-75	25-35	5-10
	30-60	Sandy loam, coarse sandy loam.	SM	A-2, A-4	0	80-100	75-100	40-70	25-50	20-30	NP-5

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
112*:											
Dunnlake--------	0-4	Very stony loam	SM-SC, SC	A-4, A-6	30-40	70-90	65-85	60-75	40-50	25-35	5-15
	4-7	Clay loam, gravelly clay loam.	CL, SC, GC	A-6	0-5	65-90	60-85	55-75	45-65	30-40	10-20
	7-16	Gravelly clay, gravelly clay loam.	CL, CH, SC, GC	A-7	0-10	60-80	55-75	50-70	45-60	40-55	20-30
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bucklake--------	0-5	Very cobbly loam	CL, CL-ML, SC, SM-SC	A-4, A-6	35-60	70-85	65-80	55-70	40-55	25-35	5-15
	5-18	Gravelly clay loam.	CL, GC	A-6	0-10	55-75	50-70	45-65	40-55	30-40	10-20
	18-30	Gravelly clay, gravelly clay loam.	CL, CH, GC	A-7	0-10	55-75	50-70	45-65	40-60	40-60	20-35
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
113*:											
Dunnlake--------	0-4	Very stony loam	SM-SC, SC	A-4, A-6	30-40	70-90	65-85	60-75	40-50	25-35	5-15
	4-7	Clay loam, gravelly clay loam.	CL, SC, GC	A-6	0-5	65-90	60-85	55-75	45-65	30-40	10-20
	7-16	Gravelly clay, gravelly clay loam.	CL, CH, SC, GC	A-7	0-10	60-80	55-75	50-70	45-60	40-55	20-30
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bucklake--------	0-10	Loam-------------	CL-ML, CL	A-4, A-6	0-5	80-100	75-95	70-85	50-70	25-35	5-15
	10-17	Clay loam--------	CL	A-6	0-5	80-100	75-95	70-90	60-75	30-40	10-20
	17-35	Clay loam, clay	CL, CH	A-7	0-5	80-100	75-95	70-90	65-85	40-60	20-35
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
114*:											
Dunnlake--------	0-4	Very stony loam	SM-SC, SC	A-4, A-6	30-40	70-90	65-85	60-75	40-50	25-35	5-15
	4-7	Clay loam, gravelly clay loam.	CL, SC, GC	A-6	0-5	65-90	60-85	55-75	45-65	30-40	10-20
	7-16	Gravelly clay, gravelly clay loam.	CL, CH, SC, GC	A-7	0-10	60-80	55-75	50-70	45-60	40-55	20-30
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bucklake--------	0-10	Loam-------------	CL-ML, CL	A-4, A-6	0-5	80-100	75-95	70-85	50-70	25-35	5-15
	10-17	Clay loam--------	CL	A-6	0-5	80-100	75-95	70-90	60-75	30-40	10-20
	17-35	Clay loam, clay	CL, CH	A-7	0-5	80-100	75-95	70-90	65-85	40-60	20-35
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lequieu---------	0-3	Very stony loam	CL-ML, ML	A-4	40-55	80-90	75-85	65-75	50-60	25-35	5-10
	3-8	Very cobbly loam	SM-SC, SM, GM-GC, GM	A-4	25-40	55-70	50-65	45-60	35-50	25-35	5-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
115*:											
Dunnlake--------	0-4	Very stony loam	SM-SC, SC	A-4, A-6	30-40	70-90	65-85	60-75	40-50	25-35	5-15
	4-7	Clay loam, gravelly clay loam.	CL, SC, GC	A-6	0-5	65-90	60-85	55-75	45-65	30-40	10-20
	7-16	Gravelly clay, gravelly clay loam.	CL, CH, SC, GC	A-7	0-10	60-80	55-75	50-70	45-60	40-55	20-30
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lequieu---------	0-3	Very stony loam	CL-ML, ML	A-4	40-55	80-90	75-85	65-75	50-60	25-35	5-10
	3-8	Very cobbly loam	SM-SC, SM, GM-GC, GM	A-4	25-40	55-70	50-65	45-60	35-50	25-35	5-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
116*:											
Dunnlake--------	0-4	Loam------------	CL-ML, CL	A-4, A-6	0-5	80-95	75-95	70-90	50-70	25-35	5-15
	4-7	Clay loam--------	CL	A-6	0-5	80-95	75-95	70-90	60-75	30-40	10-20
	7-16	Clay, clay loam	CL, CH	A-7	0-5	80-95	75-95	70-90	55-75	40-55	20-30
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rangee----------	0-6	Sandy clay loam	SC	A-6	0-15	95-100	95-100	70-85	35-50	25-35	10-15
	6-24	Clay------------	CH	A-7	0-5	95-100	90-100	85-95	70-85	60-70	35-45
	24-30	Indurated--------	---	---	---	---	---	---	---	---	---
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
117------------- Eastable	0-4	Loam------------	CL-ML, ML	A-4	0	90-100	85-100	70-95	50-75	25-35	5-10
	4-18	Loam, clay loam	CL-ML, CL	A-4, A-6	0	90-100	85-100	70-95	55-75	25-35	5-15
	18-62	Loam------------	CL-ML, CL	A-4, A-6	0	90-100	85-100	70-95	50-75	25-35	5-15
118*:											
Eastable--------	0-4	Loam------------	CL-ML, ML	A-4	0	90-100	85-100	70-95	50-75	25-35	5-10
	4-18	Loam, clay loam	CL-ML, CL	A-4, A-6	0	90-100	85-100	70-95	55-75	25-35	5-15
	18-62	Loam------------	CL-ML, CL	A-4, A-6	0	90-100	85-100	70-95	50-75	25-35	5-15
Hedox-----------	0-8	Loam------------	ML	A-4, A-5	0-5	85-100	80-100	70-90	50-65	30-45	NP-10
	8-19	Loam------------	ML	A-4, A-5	0-5	80-95	75-85	65-75	50-60	30-45	NP-10
	19-27	Gravelly loam----	GM, SM	A-4, A-5	0-10	65-80	60-75	50-75	35-50	30-45	NP-10
	27	Weathered bedrock	---	---	---	---	---	---	---	---	---
119, 120--------- Esro	0-26	Loam------------	ML	A-4	0	100	95-100	95-100	80-100	30-40	NP-10
	26-40	Silt loam, silty clay loam, clay loam.	ML	A-4, A-6	0	100	95-100	95-100	80-100	30-40	5-15
	40-60	Stratified sandy loam to sandy clay loam.	SM-SC, SC	A-4, A-6	0	85-100	75-100	50-80	35-50	25-35	5-15
121------------- Forbar	0-7	Fine sand--------	SM	A-2	0	90-100	85-100	55-75	15-30	---	NP
	7-60	Fine sand--------	SM	A-2	0	80-100	75-100	50-70	15-30	---	NP
122, 123--------- Fordney	0-9	Loamy fine sand	SM	A-4, A-2	0	100	100	75-85	30-45	---	NP
	9-60	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-1, A-2, A-3, A-4	0	100	90-100	45-85	5-45	---	NP

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
124--------------- Fordney	0-9	Loamy fine sand	SM	A-4, A-2	0	100	100	75-85	30-45	---	NP
	9-60	Loamy fine sand, loamy sand, sand.	SM, SP-SM	A-2, A-4, A-3	0	100	90-100	50-85	5-45	---	NP
125*:											
Fredonyer-------	0-10	Very stony loam	GM, SM, GM-GC, SM-SC	A-4	30-50	60-80	55-75	40-60	35-50	25-35	5-10
	10-25	Very cobbly loam	GM, GM-GC	A-2, A-4	35-45	60-65	55-60	40-50	30-45	25-35	5-10
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Mahogan---------	0-13	Loam-------------	CL-ML, ML	A-4	0	80-95	75-95	65-85	50-65	25-35	5-10
	13-38	Gravelly loam, gravelly sandy clay loam.	GM-GC, GC, SM-SC, SC	A-4, A-6	0-5	60-80	55-75	50-65	35-45	25-35	5-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
126*:											
Fredonyer-------	0-10	Very stony loam	GM, SM, GM-GC, SM-SC	A-4	30-50	60-80	55-75	40-60	35-50	25-35	5-10
	10-25	Very cobbly loam	GM, GM-GC	A-2, A-4	35-45	60-65	55-60	40-50	30-45	25-35	5-10
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
127*, 128*:											
Hedox-----------	0-8	Loam-------------	ML	A-4, A-5	0-5	85-100	80-100	70-90	50-65	30-45	NP-10
	8-19	Loam-------------	ML	A-4, A-5	0-5	80-95	75-85	65-75	50-60	30-45	NP-10
	19-27	Gravelly loam----	GM, SM	A-4, A-5	0-10	65-80	60-75	50-75	35-50	30-45	NP-10
	27	Weathered bedrock	---	---	---	---	---	---	---	---	---
Porterfield-----	0-13	Loam-------------	CL-ML, ML	A-4	0-5	80-100	75-95	65-85	50-65	25-35	5-10
	13-15	Very gravelly loam.	GM-GC, GM	A-2	5-15	35-55	30-50	25-45	20-35	25-35	5-10
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
129*:											
Hedox-----------	0-8	Stony loam-------	ML	A-4, A-5	20-45	90-100	85-100	75-85	50-65	30-45	NP-10
	8-19	Stony loam-------	ML	A-4, A-5	20-45	90-100	85-100	75-85	50-65	30-45	NP-10
	19-27	Gravelly loam----	GM, SM	A-4, A-5	5-15	65-80	60-75	50-75	35-50	30-45	NP-10
	27	Weathered bedrock	---	---	---	---	---	---	---	---	---
Porterfield-----	0-4	Stony loam-------	CL-ML, ML	A-4	5-25	80-100	75-95	70-85	50-65	25-35	5-10
	4-13	Gravelly loam----	GM-GC, GM, SM-SC, SM	A-4	5-10	65-80	60-75	55-70	40-50	25-35	5-10
	13-15	Very gravelly loam.	GM-GC, GM	A-2	5-15	50-55	35-50	25-45	20-35	25-35	5-10
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
130*:											
Inlow-----------	0-13	Silt loam--------	CL-ML, ML	A-4	0	100	95-100	85-95	70-85	25-35	5-10
	13-33	Silt loam, loam, clay loam.	CL	A-6	0	100	95-100	85-95	70-90	30-40	10-20
	33-59	Cemented---------	---	---	---	---	---	---	---	---	---
	59-69	Loamy fine sand, fine sand, loamy sand.	SM	A-2	0	95-100	95-100	60-80	15-35	---	NP
Modoc-----------	0-12	Loam-------------	ML, CL-ML	A-4	0	80-100	75-100	60-85	50-60	25-35	5-10
	12-21	Loam-------------	CL-ML, CL	A-4, A-6	0	80-100	75-100	60-85	50-60	25-35	5-15
	21-34	Sandy clay loam, clay loam.	SC, CL	A-6	0	80-100	75-100	60-90	35-65	30-40	10-20
	34-55	Indurated--------	---	---	---	---	---	---	---	---	---
	55-60	Stratified sandy loam to gravelly sand.	SM	A-1, A-2	0	60-95	50-90	30-60	20-35	20-30	NP-5
131*:											
Inlow-----------	0-13	Silt loam--------	CL-ML, ML	A-4	0	100	95-100	85-95	70-85	25-35	5-10
	13-33	Silt loam, loam, clay loam.	CL	A-6	0	100	95-100	85-95	70-90	30-40	10-20
	33-59	Cemented---------	---	---	---	---	---	---	---	---	---
	59-69	Loamy fine sand, fine sand, loamy sand.	SM	A-2	0	95-100	95-100	60-80	15-35	---	NP
Ocho------------	0-9	Very fine sandy loam.	ML	A-4	0	100	100	85-95	50-65	---	NP
	9-16	Loam, silt loam	CL, CL-ML	A-4, A-6	0	100	100	85-100	70-85	25-35	5-15
	16-34	Cemented---------	---	---	---	---	---	---	---	---	---
	34-49	Very fine sandy loam, silt loam.	ML	A-4	0	100	100	85-95	50-80	---	NP
	49-60	Loamy sand-------	SM	A-2	0	100	100	50-65	20-35	---	NP
132*:											
Inlow-----------	0-13	Silt loam--------	CL-ML, ML	A-4	0	100	95-100	85-95	70-85	25-35	5-10
	13-33	Silt loam, loam, clay loam.	CL	A-6	0	100	95-100	85-95	70-90	30-40	10-20
	33-59	Cemented---------	---	---	---	---	---	---	---	---	---
	59-69	Loamy fine sand, fine sand, loamy sand.	SM	A-2	0	95-100	95-100	60-80	15-35	---	NP
Ocho------------	0-9	Very fine sandy loam.	ML	A-4	0	100	100	85-95	50-65	---	NP
	9-16	Loam, silt loam	CL, CL-ML	A-4, A-6	0	100	100	85-100	70-85	25-35	5-15
	16-34	Cemented---------	---	---	---	---	---	---	---	---	---
	34-49	Very fine sandy loam, silt loam.	ML	A-4	0	100	100	85-95	50-80	---	NP
	49-60	Loamy sand-------	SM	A-2	0	100	100	50-65	20-35	---	NP
Modoc-----------	0-12	Loam-------------	ML, CL-ML	A-4	0	80-100	75-100	60-85	50-60	25-35	5-10
	12-21	Loam-------------	CL-ML, CL	A-4, A-6	0	80-100	75-100	60-85	50-60	25-35	5-15
	21-34	Sandy clay loam, clay loam.	SC, CL	A-6	0	80-100	75-100	60-90	35-65	30-40	10-20
	34-55	Indurated--------	---	---	---	---	---	---	---	---	---
	55-60	Stratified sandy loam to gravelly sand.	SM	A-1, A-2	0	60-95	50-90	30-60	20-35	20-30	NP-5

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
133-------------- Kalo	0-5	Stony sandy loam	SM, SM-SC	A-2, A-4	15-35	90-95	85-95	45-60	25-45	20-30	NP-10
	5-27	Very cobbly loam, very cobbly clay loam.	SC, CL	A-6	35-55	70-80	65-75	50-65	40-55	30-40	10-20
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
134-------------- Kalo	0-5	Very stony sandy loam.	SM, SM-SC	A-2, A-4	35-50	90-95	85-95	40-55	25-45	20-30	NP-10
	5-27	Very cobbly loam, very cobbly clay loam.	SC, CL	A-6	35-55	70-80	65-75	50-65	40-55	30-40	10-20
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
135*:											
Karoc-----------	0-3	Very gravelly sandy loam.	GM, SM	A-1	5-25	40-60	35-55	20-40	10-25	20-30	NP-5
	3-62	Very gravelly sandy loam.	GM, SM	A-1	5-25	40-60	35-55	20-40	10-25	20-30	NP-5
Rock outcrop.											
136-------------- Laki	0-12	Fine sandy loam	ML, SM	A-4	0	100	100	70-95	40-60	---	NP
	12-60	Loam, fine sandy loam.	ML	A-4	0	100	100	80-95	50-75	---	NP
137*:											
Laki------------	0-12	Fine sandy loam	ML, SM	A-4	0	100	100	70-95	40-75	---	NP
	12-60	Loam, fine sandy loam.	ML	A-4	0	100	100	80-95	50-75	---	NP
Henley----------	0-11	Sandy loam-------	SM	A-4, A-2	0	100	100	60-70	30-40	20-25	NP-5
	11-25	Loam, fine sandy loam, sandy loam.	CL, SC, CL-ML, SM-SC	A-4, A-2, A-6	0	100	100	60-95	30-75	25-35	5-15
	25-31	Indurated--------	---	---	---	---	---	---	---	---	---
	31-60	Stratified sandy loam to silt loam.	CL, CL-ML, ML, SC	A-4, A-2, A-6	0	100	100	65-90	40-85	25-35	5-15
138-------------- Lalos	0-13	Very fine sandy loam.	ML	A-4, A-5	0	100	100	90-100	50-65	35-45	NP-10
	13-30	Loam, clay loam	ML	A-4, A-7	0	100	100	90-100	60-80	35-45	5-15
	30-65	Loam, very fine sandy loam.	ML	A-4, A-5	0	100	100	90-100	50-75	35-45	NP-10
139*:											
Lalos-----------	0-13	Very fine sandy loam.	ML	A-4, A-5	0	100	100	90-100	50-65	35-45	NP-10
	13-30	Loam, clay loam	ML	A-4, A-7	0	100	100	90-100	60-80	35-45	5-15
	30-65	Loam, very fine sandy loam.	ML	A-4, A-5	0	100	100	90-100	50-75	35-45	NP-10
Blownout land.											
140-------------- Lamath	0-21	Silt loam--------	MH, OH	A-5	0	100	100	90-100	70-90	50-60	NP-10
	21-53	Sand, loamy sand	SM, SP-SM	A-2, A-3	0	100	95-100	50-95	5-25	---	NP
	53-60	Stratified sand to silt loam.	SM, SM-SC	A-2, A-4	0	100	95-100	50-80	10-40	20-30	NP-10

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
141------------- Leavers	0-15	Sandy loam-------	SM	A-2, A-4	0	95-100	95-100	60-70	30-50	20-30	NP-5
	15-25	Sandy loam-------	SM	A-2, A-4	0	85-100	85-95	50-70	30-50	20-30	NP-5
	25-60	Very gravelly loamy sand, very gravelly sand.	GM, GP-GM	A-1	0	30-55	25-50	15-35	5-15	---	NP
142------------- Leavers	0-15	Sandy loam-------	SM	A-2, A-4	0	95-100	95-100	60-70	30-50	20-30	NP-5
	15-25	Sandy loam-------	SM	A-2, A-4	0	85-100	85-95	50-65	30-50	20-30	NP-5
	25-60	Very gravelly loamy sand, very gravelly sand.	GM, GP-GM	A-1	0	30-55	25-50	15-35	5-15	---	NP
143------------- Lequieu	0-3	Very stony loam	CL-ML, ML	A-4	40-55	80-90	75-85	65-75	50-60	25-35	5-10
	3-8	Very cobbly loam	SM-SC, SM, GM-GC, GM	A-4	25-40	55-70	50-65	45-60	35-50	25-35	5-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
144*:											
Lequieu---------	0-3	Very stony loam	CL-ML, ML	A-4	40-55	80-90	75-85	65-75	50-60	25-35	5-10
	3-8	Very cobbly loam	SM-SC, SM, GM-GC, GM	A-4	25-40	55-70	50-65	45-60	35-50	25-35	5-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Adieux----------	0-4	Sandy loam-------	SM	A-4	5-10	95-100	90-100	65-75	35-50	20-30	NP-5
	4-32	Loam-------------	CL-ML, CL	A-4, A-6	5-10	95-100	90-100	75-95	60-75	25-35	5-15
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
145*:											
Lorella---------	0-8	Very stony loam	GM, ML, SM	A-2, A-4	50-70	55-95	50-90	40-85	30-70	20-30	NP-5
	8-11	Gravelly clay loam, very cobbly clay loam.	GC, CL, SC	A-6	5-30	55-80	55-75	45-75	35-60	35-40	15-20
	11-16	Very gravelly clay, very cobbly clay, very cobbly clay loam.	GC, CL, SC	A-2, A-6, A-7	15-50	35-55	35-50	25-45	20-40	35-50	15-25
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Fiddler---------	0-8	Very stony loam	CL-ML, ML	A-4	25-55	95-100	90-100	80-90	55-75	25-35	5-10
	8-26	Very stony clay loam, very stony clay, very cobbly clay loam.	CL, CH	A-7	40-50	75-90	70-85	65-75	50-65	40-60	20-35
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
146*:											
Madeline	0-6	Very cobbly loam	GM-GC, GC, SM-SC, SC	A-4, A-6	30-50	55-75	50-70	45-65	35-50	25-35	5-15
	6-13	Stony clay, cobbly clay.	CH	A-7	15-30	70-95	65-90	60-85	50-75	50-60	25-35
	13-16	Gravelly clay, gravelly clay loam.	GC, CH, CL	A-7	0-5	60-80	50-75	45-70	35-60	45-60	20-35
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Capona	0-10	Cobbly loam	ML	A-4	20-45	80-95	75-90	70-80	50-65	25-35	NP-10
	10-34	Cobbly sandy clay loam, cobbly loam.	SM, SM-SC, ML, CL-ML	A-4, A-2	20-40	75-90	70-85	65-75	25-60	25-35	5-10
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
147*:											
Mahogan	0-13	Loam	CL-ML, ML	A-4	0	80-95	75-95	65-85	50-65	25-35	5-10
	13-38	Gravelly loam, gravelly sandy clay loam.	GM-GC, GC, SM-SC, SC	A-4, A-6	0-5	60-80	55-75	50-65	35-45	25-35	5-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Fredonyer	0-10	Very stony loam	GM, SM, GM-GC, SM-SC	A-4	30-50	60-80	55-75	40-60	35-50	25-35	5-10
	10-25	Very cobbly loam	GM, GM-GC	A-2, A-4	35-45	60-65	55-60	40-50	30-45	25-35	5-10
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
148 Medford	0-6	Silty clay loam	CL	A-6	0-10	90-100	80-100	75-100	55-85	35-40	15-20
	6-36	Silty clay loam, clay loam, silty clay.	CL	A-7	0-10	90-100	80-100	75-100	70-95	40-50	20-25
	36-62	Stratified sandy clay loam to silty clay loam.	SC, CL	A-6	0-10	90-100	80-100	60-100	40-80	30-40	10-20
149 Modoc	0-12	Loam	ML, CL-ML	A-4	0	80-100	75-100	60-85	50-60	25-35	5-10
	12-21	Loam	CL-ML, CL	A-4, A-6	0	80-100	75-100	60-85	50-60	25-35	5-15
	21-34	Sandy clay loam, clay loam.	SC, CL	A-6	0	80-100	75-100	60-90	35-65	30-40	10-20
	34-55	Indurated	---	---	---	---	---	---	---	---	---
	55-60	Stratified sandy loam to gravelly sand.	SM	A-1, A-2	0	60-95	50-90	30-60	20-35	20-30	NP-5
150 Modoc	0-8	Loam	ML, CL-ML	A-4	0	80-100	75-100	60-85	50-60	25-35	5-10
	8-25	Sandy clay loam, clay loam.	SC, CL	A-6	0	80-100	75-100	60-90	35-65	30-40	10-20
	25-48	Indurated	---	---	---	---	---	---	---	---	---
	48	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
151*, 152*:											
Mojo	0-9	Stony loam	ML, CL-ML	A-4	5-15	80-95	80-95	65-80	50-65	25-35	5-10
	9-27	Clay loam	CL	A-6	5-10	85-95	85-95	75-90	60-80	30-40	10-20
	27-36	Very gravelly clay loam.	GC	A-6	5-10	45-65	40-60	35-55	35-50	30-40	10-20
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Pinehurst	0-15	Stony sandy loam	SM	A-4, A-2	20-30	70-80	65-75	50-60	30-40	15-25	NP-5
	15-42	Gravelly loam, gravelly clay loam.	SC, GC	A-6	0-15	55-80	50-75	50-75	35-50	30-40	10-20
	42-55	Very stony loam, very stony clay loam.	SC, GC	A-6	30-50	55-80	50-75	50-75	35-50	30-40	10-20
	55	Weathered bedrock	---	---	---	---	---	---	---	---	---
153 Mudco	0-7	Gravelly sandy loam.	SM	A-2	0	65-80	60-75	40-55	25-35	20-30	NP-5
	7-10	Sandy loam	SM-SC	A-2	0	80-95	80-90	45-65	25-35	20-30	5-10
	10-17	Gravelly sandy clay loam.	SM-SC, SC	A-2	0	65-80	60-75	55-70	25-35	25-35	5-15
	17-60	Indurated	---	---	---	---	---	---	---	---	---
154 Munnell	0-5	Gravelly loam	SM, GM	A-4	0	65-80	60-75	50-65	35-50	25-35	NP-5
	5-32	Gravelly loam, gravelly sandy clay loam, sandy clay loam.	SM-SC, SC, GM-GC, GC	A-4, A-6	0	65-90	60-85	55-70	35-50	25-35	5-15
	32-60	Very gravelly sand, very gravelly loamy sand.	GM, GP-GM	A-1	0	30-50	25-45	20-40	5-15	---	NP
155 Munnell	0-5	Gravelly loam	SM, GM	A-4	0	65-80	60-75	50-65	35-50	25-35	NP-5
	5-32	Gravelly loam, gravelly sandy clay loam, sandy clay loam.	GC, SC, GM-GC, SM-SC	A-4, A-6	0	65-90	60-85	55-70	35-50	25-35	5-15
	32-60	Very gravelly sand, very gravelly loamy sand.	GM, GP-GM	A-1	0	30-50	25-45	20-40	5-15	---	NP-5
156 Ocho Variant	0-6	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	6-19	Clay	CL, CH	A-7	0	100	100	90-100	75-95	40-60	20-35
	19-60	Cemented	---	---	---	---	---	---	---	---	---
157 Orset	0-13	Sandy loam	SM	A-4	0-5	85-100	75-100	40-70	35-50	20-30	NP-5
	13-60	Sandy loam, loam	SM, ML	A-4	0-5	85-100	75-100	40-75	35-60	20-35	NP-10
158*:											
Pinehurst	0-15	Stony sandy loam	SM	A-4, A-2	20-30	70-80	65-75	50-60	30-40	15-25	NP-5
	15-42	Gravelly loam, gravelly clay loam.	SC, GC	A-6	0-15	55-80	50-75	50-75	35-50	30-40	10-20
	42-55	Very stony loam, very stony clay loam.	SC, GC	A-6	30-50	55-80	50-75	50-75	35-50	30-40	10-20
	55	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
158*:											
Kalo	0-5	Stony sandy loam	SM, SM-SC	A-2, A-4	15-35	90-95	85-95	45-60	25-45	20-30	NP-10
	5-27	Very cobbly loam, very cobbly clay loam.	SC, CL	A-6	35-55	70-80	65-75	50-65	40-55	30-40	10-20
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
159 Pit	0-26	Silty clay	MH, CH	A-7	0	100	100	95-100	85-95	50-65	20-35
	26-31	Silty clay loam, clay loam.	ML, CL	A-6, A-7	0	100	100	90-100	75-90	30-50	10-20
	31-60	Silt loam	ML	A-4	0	100	100	90-100	70-85	30-40	5-10
160 Podus	0-18	Loamy fine sand	SM	A-2	0	100	90-100	60-75	25-35	---	NP
	18-34	Indurated	---	---	---	---	---	---	---	---	---
	34-60	Fine sandy loam	SM	A-4	0	100	100	70-85	35-50	20-30	NP-5
161 Poe	0-12	Loamy fine sand	SM	A-2, A-4	0	100	90-100	55-85	15-40	---	NP
	12-32	Loamy fine sand, loamy sand.	SM	A-2, A-4	0	100	90-100	55-85	15-40	---	NP
	32-60	Indurated	---	---	---	---	---	---	---	---	---
162 Poman	0-29	Loamy sand	SM	A-2	0	95-100	95-100	50-75	20-35	---	NP
	29-39	Indurated	---	---	---	---	---	---	---	---	---
	39-60	Sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	95-100	40-60	5-15	---	NP
163*:											
Rangee Variant	0-3	Clay loam	CL	A-6	0	100	100	90-100	70-80	30-40	10-20
	3-16	Clay	CL, CH	A-7	0	100	100	90-100	75-95	40-60	20-35
	16-35	Indurated	---	---	---	---	---	---	---	---	---
	35-60	Sandy loam	SM-SC	A-2, A-4	0	95-100	95-100	65-75	30-40	20-30	5-10
Dotta	0-15	Sandy loam	SM	A-4	0	80-100	75-100	50-70	35-50	20-30	NP-5
	15-30	Loam	CL-ML, ML	A-4	0	80-100	75-100	60-85	50-75	25-35	5-10
	30-60	Sandy loam, coarse sandy loam.	SM	A-2, A-4	0	80-100	75-100	40-70	25-50	20-30	NP-5
164, 165 Rojo	0-13	Sandy loam	SM-SC	A-2	0	85-100	85-100	50-70	25-35	15-25	5-10
	13-28	Sandy loam	SM-SC	A-2	0	85-100	85-100	50-70	25-35	15-25	5-10
	28-30	Indurated	---	---	---	---	---	---	---	---	---
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
166*. Rubble land											
167*:											
Salisbury	0-9	Cobbly loam	SM-SC, SM, GM-GC, GM	A-4	20-30	65-85	65-85	45-70	35-50	25-35	5-10
	9-23	Gravelly clay, gravelly silty clay, gravelly clay loam.	SC, GC, CH, CL	A-7	5-10	60-80	55-75	50-70	35-60	40-60	15-30
	23-60	Indurated	---	---	---	---	---	---	---	---	---
Denbar	0-8	Clay loam	CL	A-6	0-10	90-100	85-100	80-100	65-80	30-40	10-15
	8-29	Clay loam, clay	CL, CH	A-7	0-10	90-100	85-100	80-100	70-90	45-60	20-35
	29-48	Sandy loam	SM-SC, SM	A-2	0-10	90-100	85-100	50-70	25-35	20-30	NP-10
	48-60	Indurated	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
168*, 169*:											
Searles	0-10	Very stony loam	GM, ML	A-2, A-4	25-50	60-75	40-65	35-60	25-55	30-35	5-10
	10-28	Extremely gravelly clay loam, very cobbly loam, very cobbly clay loam.	GC	A-2	25-60	30-50	25-45	20-35	15-30	30-40	10-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Dunnlake	0-4	Very stony loam	SM-SC, SC	A-4, A-6	30-40	70-90	65-85	60-75	40-50	25-35	5-15
	4-7	Clay loam, gravelly clay loam.	CL, SC, GC	A-6	0-5	65-90	60-85	55-75	45-65	30-40	10-20
	7-16	Gravelly clay, gravelly clay loam.	CL, CH, SC, GC	A-7	0-10	60-80	55-75	50-70	45-60	40-55	20-30
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
170*, 171*:											
Searles	0-10	Very stony loam	GM, ML	A-2, A-4	25-50	60-75	40-65	35-60	25-55	30-35	5-10
	10-28	Extremely gravelly clay loam, very cobbly loam, very cobbly clay loam.	GC	A-2	25-60	30-50	25-45	20-35	15-30	30-40	10-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Orhood	0-4	Very cobbly loam	GM, SM	A-4	45-60	55-75	50-70	45-60	35-50	25-35	NP-5
	4-8	Very cobbly loam	GM-GC, GC, SM-SC, SC	A-4, A-6	45-60	55-75	50-70	45-65	35-50	25-35	5-15
	8-16	Very cobbly loam, very cobbly clay loam.	GM-GC, GC	A-4, A-6	45-55	60-70	55-65	45-60	35-50	25-40	5-20
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
172*:											
Searles	0-10	Very stony loam	GM, ML	A-2, A-4	25-50	60-75	40-65	35-60	25-55	30-35	5-10
	10-28	Extremely gravelly clay loam, very cobbly loam, very cobbly clay loam.	GC	A-2	25-60	30-50	25-45	20-35	15-30	30-40	10-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rubble land.											

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
173*:											
Searles	0-10	Very stony loam	GM, ML	A-2, A-4	25-50	60-75	40-65	35-60	25-55	30-35	5-10
	10-28	Extremely gravelly clay loam, very cobbly loam, very cobbly clay loam.	GC	A-2	25-60	30-50	25-45	20-35	15-30	30-40	10-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Truax	0-8	Fine sandy loam	SM	A-4	0-15	95-100	95-100	70-85	35-50	20-30	NP-5
	8-29	Sandy clay loam, loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0-15	95-100	95-100	75-85	35-60	25-35	5-15
	29-36	Sandy loam	SM	A-4	0-15	95-100	95-100	60-70	35-50	20-30	NP-5
	36-60	Sandy loam	SM	A-4	0-15	95-100	95-100	60-70	35-50	20-30	NP-5
Orhood	0-4	Very cobbly loam	GM, SM	A-4	45-60	55-75	50-70	45-60	35-50	25-35	NP-5
	4-8	Very cobbly loam	GM-GC, GC, SM-SC, SC	A-4, A-6	45-60	55-75	50-70	45-65	35-50	25-35	5-15
	8-16	Very cobbly loam, very cobbly clay loam.	GM-GC, GC	A-4, A-6	45-55	60-70	55-65	45-60	35-50	25-40	5-20
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
174 Searles Variant	0-8	Very stony loam	SM-SC, SM, GM-GC, GM	A-4	30-50	50-75	45-70	40-65	35-50	25-35	5-10
	8-16	Very cobbly loam	SM-SC, SC, GM-GC, GC	A-4, A-6	30-50	50-75	45-70	40-65	35-50	25-35	5-15
	16-45	Very cobbly clay, very cobbly clay loam.	GC, CL, CH	A-7	30-50	50-75	45-70	45-65	35-60	40-60	15-30
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
175 Sheld	0-9	Stony sandy loam	SM	A-1, A-2	5-15	65-80	60-75	40-60	20-35	20-30	NP-5
	9-17	Gravelly sandy loam.	SM, GM	A-1, A-2	5-15	55-80	50-75	40-60	20-35	20-30	NP-5
	17-24	Very gravelly sandy loam, very gravelly loam.	GM	A-1, A-2	10-20	35-60	30-50	25-45	15-30	20-30	NP-5
	24-44	Very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	15-20	35-60	30-50	25-45	15-35	20-30	NP-5
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
176 Sheld	0-9	Very stony sandy loam.	SM	A-1, A-2	10-25	65-80	60-75	40-60	20-35	20-30	NP-5
	9-17	Gravelly sandy loam.	SM, GM	A-1, A-2	5-15	55-80	50-75	40-60	20-35	20-30	NP-5
	17-24	Very gravelly sandy loam, very gravelly loam.	GM	A-1, A-2	10-20	35-60	30-50	25-45	15-30	20-30	NP-5
	24-44	Very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	15-20	35-60	30-50	25-45	15-35	20-30	NP-5
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
177------------ Snell	0-4	Very stony loam	SM, ML	A-4	30-65	80-100	70-100	60-95	40-85	30-35	5-10
	4-21	Very cobbly clay loam, extremely stony clay loam, very cobbly clay.	GC, SC, CL, CH	A-2, A-7	50-80	55-100	45-100	40-100	30-85	40-55	20-35
	21	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
178------------ Stukel	0-6	Sandy loam-------	SM	A-4	0	80-100	75-90	50-75	35-50	---	NP
	6-17	Loam, sandy loam, gravelly loam.	ML, SM	A-4, A-2	0	80-100	70-90	50-85	30-70	---	NP
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
179*:											
Stukel----------	0-6	Sandy loam-------	SM	A-4	0	80-100	75-90	50-75	35-50	---	NP
	6-17	Loam, sandy loam, gravelly loam.	ML, SM	A-4, A-2	0	80-100	70-90	50-85	30-70	---	NP
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Capona----------	0-10	Fine sandy loam	ML, SM	A-4	0	80-100	75-100	60-95	35-60	20-30	NP-5
	10-34	Gravelly sandy clay loam, loam, gravelly loam.	SM, ML	A-4, A-2	0-25	70-95	65-90	50-85	25-60	30-35	5-10
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
180------------ Teeters	0-10	Silt loam--------	MH, OH	A-5	0	100	100	90-100	80-100	50-60	NP-10
	10-60	Silt, silt loam	MH, OH	A-5	0	100	100	90-100	80-100	50-60	NP-10
181------------ Truax	0-8	Fine sandy loam	SM	A-4	0-15	95-100	95-100	70-85	35-50	20-30	NP-5
	8-29	Sandy clay loam, loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0-15	95-100	95-100	75-85	35-60	25-35	5-15
	29-36	Sandy loam-------	SM	A-4	0-15	95-100	95-100	60-70	35-50	20-30	NP-5
	36-60	Sandy loam-------	SM	A-4	0-15	95-100	95-100	60-70	35-50	20-30	NP-5
182*:											
Truax-----------	0-8	Fine sandy loam	SM	A-4	0-15	95-100	95-100	70-85	35-50	20-30	NP-5
	8-29	Sandy clay loam, loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0-15	95-100	95-100	75-85	35-60	25-35	5-15
	29-36	Sandy loam-------	SM	A-4	0-15	95-100	95-100	60-70	35-50	20-30	NP-5
	36-60	Sandy loam-------	SM	A-4	0-15	95-100	95-100	60-70	35-50	20-30	NP-5
Searles---------	0-10	Very stony loam	GM, ML	A-2, A-4	25-50	60-75	40-65	35-60	25-55	30-35	5-10
	10-28	Extremely gravelly clay loam, very cobbly loam, very cobbly clay loam.	GC	A-2	25-60	30-50	25-45	20-35	15-30	30-40	10-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
183------------ Tulana	0-12	Silt loam--------	MH	A-5	0	100	100	90-100	80-100	50-60	NP-10
	12-41	Silt, silt loam, silty clay loam.	MH	A-5	0	100	100	95-100	75-100	50-60	NP-10
	41-60	Stratified silt loam to fine sand.	SM, ML	A-4	0	100	100	95-100	35-60	---	NP

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
184-------------- Tulana Variant	0-22	Mucky-peat-------	PT	A-8	0	---	---	---	---	---	---
	22-60	Silt-------------	ML	A-4	0	100	100	95-100	90-100	20-30	NP-5
185-------------- Tulebasin	0-14	Mucky silty clay loam.	ML, MH	A-6, A-7	0	100	100	95-100	85-95	35-55	10-20
	14-32	Silty clay-------	MH	A-7	0	100	100	95-100	90-95	50-65	20-30
	32-60	Silty clay loam, silty clay.	ML, MH	A-6, A-7	0	100	100	95-100	85-95	35-65	10-30
186-------------- Zanbur	0-8	Sandy loam-------	SM, SM-SC	A-4	0	80-100	75-100	50-70	35-45	20-30	NP-10
	8-20	Loamy fine sand, loamy sand.	SM	A-2	0	80-100	75-100	50-70	10-30	---	NP
	20-60	Silt loam--------	ML	A-4, A-5, A-7	0	100	100	90-100	70-90	30-50	5-15
187-------------- Zuman	0-4	Loamy fine sand	SM	A-2	0	100	100	70-80	25-35	---	NP
	4-14	Silt loam, silty clay loam, sandy clay loam.	ML	A-4, A-7, A-5	0	100	100	90-100	60-85	35-50	5-15
	14-60	Loamy fine sand, fine sand.	SM	A-2	0	100	100	75-85	15-35	---	NP
188-------------- Zuman	0-4	Silt loam--------	ML	A-4	0	100	100	90-100	70-85	35-40	5-10
	4-14	Silt loam, silty clay loam, sandy clay loam.	ML	A-4, A-7, A-5	0	100	100	80-100	60-85	35-50	5-15
	14-60	Loamy fine sand, fine sand.	SM	A-2	0	100	100	75-85	15-35	---	NP

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
101--------------	0-9	0-5	2.0-6.0	0.06-0.08	5.6-7.3	<2	Low--------	0.10	5	8	<1
Avis	9-60	0-5	6.0-20	0.03-0.05	5.6-6.5	<2	Low--------	0.10			
102--------------	0-26	---	0.6-2.0	0.39-0.55	7.4-8.4	<2	Low--------	0.43	5	4L	5-10
Capjac	26-60	---	0.6-2.0	0.39-0.55	7.4-8.4	2-8	Low--------	0.49			
103--------------	0-26	---	0.6-2.0	0.39-0.55	7.4-8.4	<2	Low--------	0.43	5	8	5-10
Capjac	26-60	---	0.6-2.0	0.39-0.55	7.4-8.4	2-8	Low--------	0.49			
104--------------	0-10	18-27	0.6-2.0	0.12-0.16	6.1-7.3	<2	Low--------	0.20	2	8	1-2
Capona	10-34	18-27	0.6-2.0	0.12-0.16	6.1-7.3	<2	Low--------	0.17			
	34	---	---	---	---	---	-----------	----			
105*:											
Capona----------	0-10	18-27	0.6-2.0	0.12-0.16	6.1-7.3	<2	Low--------	0.20	2	8	1-2
	10-34	18-27	0.6-2.0	0.12-0.16	6.1-7.3	<2	Low--------	0.17			
	34	---	---	---	---	---	-----------	----			
Rock outcrop.											
106, 107---------	0-15	10-16	2.0-6.0	0.11-0.13	6.6-7.3	<2	Low--------	0.32	5	3	1-3
Dehill	15-60	12-18	2.0-6.0	0.11-0.13	6.6-7.8	<2	Low--------	0.32			
108--------------	0-12	10-18	2.0-6.0	0.07-0.10	7.4-8.4	<2	Low--------	0.15	5	8	1-5
Demox	12-62	10-18	2.0-6.0	0.05-0.08	7.4-8.4	<2	Low--------	0.10			
109*:											
Demox-----------	0-12	10-18	2.0-6.0	0.05-0.09	7.4-8.4	<2	Low--------	0.10	5	8	1-5
	12-62	10-18	2.0-6.0	0.05-0.08	7.4-8.4	<2	Low--------	0.10			
Rubble land.											
110--------------	0-14	5-15	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low--------	0.28	2	3	1-2
Doel	14-21	6-17	2.0-6.0	0.10-0.13	7.9-8.4	<2	Low--------	0.32			
	21-29	5-15	2.0-6.0	0.10-0.13	7.9-8.4	<2	Low--------	0.32			
	29-48	---	---	---	---	---	-----------	----			
	48-60	0-5	6.0-20	0.06-0.08	6.6-7.3	<2	Low--------	0.15			
111--------------	0-15	10-20	0.6-2.0	0.11-0.13	6.1-7.3	<2	Low--------	0.28	5	3	1-3
Dotta	15-30	18-27	0.2-0.6	0.13-0.16	5.6-7.3	<2	Low--------	0.37			
	30-60	5-15	2.0-6.0	0.09-0.11	5.6-7.3	<2	Low--------	0.20			
112*:											
Dunnlake--------	0-4	18-27	0.6-2.0	0.08-0.11	6.1-7.3	<2	Low--------	0.15	1	8	1-2
	4-7	27-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate	0.32			
	7-16	35-50	0.06-0.2	0.12-0.14	6.6-7.8	<2	High------	0.15			
	16	---	---	---	---	---	-----------	----			
Bucklake--------	0-5	20-25	0.6-2.0	0.08-0.10	6.1-7.3	<2	Moderate	0.15	2	8	1-2
	5-18	27-35	0.2-0.6	0.11-0.14	6.6-7.8	<2	Moderate	0.20			
	18-30	35-50	0.06-0.2	0.10-0.12	6.6-7.8	<2	High------	0.20			
	30	---	---	---	---	---	-----------	----			

See footnote at end of table.

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
113*:											
Dunnlake--------	0-4	18-27	0.6-2.0	0.08-0.11	6.1-7.3	<2	Low--------	0.15	1	8	1-2
	4-7	27-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate	0.32			
	7-16	35-50	0.06-0.2	0.12-0.14	6.6-7.8	<2	High------	0.15			
	16	---	---	---	---	---	----------	----			
Bucklake--------	0-10	20-25	0.6-2.0	0.13-0.16	6.1-7.3	<2	Moderate	0.32	2	8	1-2
	10-17	27-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate	0.28			
	17-35	35-50	0.06-0.2	0.14-0.17	6.1-7.3	<2	High------	0.24			
	35	---	---	---	---	---	----------	----			
114*:											
Dunnlake--------	0-4	18-27	0.6-2.0	0.08-0.11	6.1-7.3	<2	Low--------	0.15	1	8	1-2
	4-7	27-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate	0.32			
	7-16	35-50	0.06-0.2	0.12-0.14	6.6-7.8	<2	High------	0.15			
	16	---	---	---	---	---	----------	----			
Bucklake--------	0-10	20-25	0.6-2.0	0.13-0.16	6.1-7.3	<2	Moderate	0.32	2	8	1-2
	10-17	27-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate	0.28			
	17-35	35-50	0.06-0.2	0.14-0.17	6.1-7.3	<2	High------	0.24			
	35	---	---	---	---	---	----------	----			
Lequieu---------	0-3	20-25	0.6-2.0	0.07-0.10	6.6-7.3	<2	Low--------	0.10	1	8	<1
	3-8	20-25	0.6-2.0	0.07-0.10	6.6-7.3	<2	Low--------	0.10			
	8	---	---	---	---	---	----------	----			
115*:											
Dunnlake--------	0-4	18-27	0.6-2.0	0.08-0.11	6.1-7.3	<2	Low--------	0.15	1	8	1-2
	4-7	27-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate	0.32			
	7-16	35-50	0.06-0.2	0.12-0.14	6.6-7.8	<2	High------	0.15			
	16	---	---	---	---	---	----------	----			
Lequieu---------	0-3	20-25	0.6-2.0	0.07-0.10	6.6-7.3	<2	Low--------	0.10	1	8	<1
	3-8	20-25	0.6-2.0	0.07-0.10	6.6-7.3	<2	Low--------	0.10			
	8	---	---	---	---	---	----------	----			
116*:											
Dunnlake--------	0-4	18-27	0.6-2.0	0.12-0.15	6.1-7.3	<2	Moderate	0.37	1	6	1-2
	4-7	27-35	0.2-0.6	0.16-0.18	6.1-7.3	<2	Moderate	0.37			
	7-16	35-50	0.06-0.2	0.12-0.15	6.6-7.8	<2	High------	0.32			
	16	---	---	---	---	---	----------	----			
Rangee----------	0-6	20-27	0.2-0.6	0.13-0.16	6.6-7.3	<2	Moderate	0.24	2	4	1-2
	6-24	60-65	<0.06	0.11-0.14	6.6-7.8	<2	High------	0.20			
	24-30	---	---	---	---	---	----------	----			
	30	---	---	---	---	---	----------	----			
117-------------- Eastable	0-4	15-27	0.6-2.0	0.14-0.17	6.6-8.4	<2	Low--------	0.32	5	6	1-3
	4-18	18-30	0.2-0.6	0.15-0.18	6.6-8.4	<2	Moderate	0.32			
	18-62	18-27	0.6-2.0	0.14-0.17	6.6-8.4	<2	Moderate	0.37			
118*:											
Eastable--------	0-4	15-27	0.6-2.0	0.14-0.17	6.6-8.4	<2	Low--------	0.32	5	6	1-3
	4-18	18-30	0.2-0.6	0.15-0.18	6.6-8.4	<2	Moderate	0.32			
	18-62	18-27	0.6-2.0	0.14-0.17	6.6-8.4	<2	Moderate	0.37			
Hedox-----------	0-8	18-25	0.6-2.0	0.17-0.20	6.6-7.3	<2	Low--------	0.32	2	6	<1
	8-19	18-25	0.6-2.0	0.17-0.20	6.6-7.3	<2	Low--------	0.32			
	19-27	18-25	0.6-2.0	0.12-0.15	6.6-7.8	<2	Low--------	0.24			
	27	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
119, 120 Esro	0-26	18-25	0.6-2.0	0.14-0.17	6.1-7.3	<2	Low	0.37	5	8	2-6
	26-40	18-30	0.2-0.6	0.14-0.18	6.6-7.8	<2	Moderate	0.43			
	40-60	15-25	0.2-0.6	0.11-0.17	6.6-7.8	<2	Moderate	0.24			
121 Forbar	0-7	0-5	6.0-20	0.04-0.08	7.4-8.4	<2	Low	0.10	5	8	.5-1
	7-60	0-5	6.0-20	0.04-0.08	6.1-8.4	<2	Low	0.10			
122, 123 Fordney	0-9	5-15	2.0-6.0	0.09-0.14	6.6-8.4	<2	Low	0.15	5	2	1-3
	9-60	5-15	6.0-20	0.09-0.14	6.6-8.4	<2	Low	0.15			
124 Fordney	0-9	10-15	2.0-6.0	0.09-0.14	6.6-8.4	<2	Low	0.15	5	2	2-3
	9-60	5-15	6.0-20	0.09-0.14	6.6-8.4	<2	Low	0.15			
125*:											
Fredonyer	0-10	15-22	0.6-2.0	0.07-0.09	6.1-7.3	<2	Low	0.15	2	8	1-3
	10-25	18-25	0.6-2.0	0.07-0.10	6.1-7.3	<2	Low	0.15			
	25	---	---	---	---	---	---	----			
Mahogan	0-13	10-15	0.6-2.0	0.14-0.16	6.6-7.3	<2	Low	0.32	2	5	1-2
	13-38	18-25	0.6-2.0	0.10-0.14	6.6-7.3	<2	Low	0.20			
	38	---	---	---	---	---	---	----			
126*:											
Fredonyer	0-10	15-22	0.6-2.0	0.07-0.09	6.1-7.3	<2	Low	0.15	2	8	1-3
	10-25	18-25	0.6-2.0	0.07-0.10	6.1-7.3	<2	Low	0.15			
	25	---	---	---	---	---	---	----			
Rock outcrop.											
127*, 128*:											
Hedox	0-8	18-25	0.6-2.0	0.17-0.20	6.6-7.3	<2	Low	0.32	2	6	<1
	8-19	18-25	0.6-2.0	0.17-0.20	6.6-7.3	<2	Low	0.32			
	19-27	18-25	0.6-2.0	0.12-0.15	6.6-7.8	<2	Low	0.24			
	27	---	---	---	---	---	---	----			
Porterfield	0-13	18-25	0.6-2.0	0.15-0.17	6.6-8.4	<2	Low	0.32	1	6	1-2
	13-15	18-25	0.6-2.0	0.07-0.11	6.6-8.4	<2	Low	0.15			
	15	---	---	---	---	---	---	----			
129*:											
Hedox	0-8	18-25	0.6-2.0	0.11-0.14	6.6-7.3	<2	Low	0.24	2	8	<1
	8-19	18-25	0.6-2.0	0.11-0.14	6.6-7.3	<2	Low	0.24			
	19-27	18-25	0.6-2.0	0.12-0.15	6.6-7.8	<2	Low	0.24			
	27	---	---	---	---	---	---	----			
Porterfield	0-4	18-25	0.6-2.0	0.11-0.14	6.6-8.4	<2	Low	0.20	1	8	<1
	4-13	18-25	0.6-2.0	0.11-0.14	6.6-8.4	<2	Low	0.20			
	13-15	18-25	0.6-2.0	0.07-0.11	6.6-8.4	<2	Low	0.15			
	15	---	---	---	---	---	---	----			
130*:											
Inlow	0-13	10-15	0.6-2.0	0.15-0.17	7.4-8.4	<2	Low	0.49	2	4L	1-2
	13-33	18-35	0.06-0.2	0.14-0.18	>8.4	2-4	Moderate	0.43			
	33-59	---	---	---	---	---	---	----			
	59-69	0-10	6.0-20	0.06-0.10	>8.4	2-4	Low	0.17			
Modoc	0-12	15-25	0.6-2.0	0.14-0.17	6.1-7.8	<2	Low	0.32	2	5	1-2
	12-21	15-25	0.2-0.6	0.14-0.16	6.6-8.4	<2	Moderate	0.32			
	21-34	25-35	0.2-0.6	0.15-0.19	6.6-8.4	<2	Moderate	0.28			
	34-55	---	---	---	---	---	---	----			
	55-60	5-10	0.6-2.0	0.08-0.10	7.4-8.4	<2	Low	0.24			

See footnote at end of table.

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
131*:											
Inlow	0-13	10-15	0.6-2.0	0.15-0.17	7.4-8.4	<2	Low	0.49	2	4L	1-2
	13-33	18-35	0.06-0.2	0.14-0.18	>8.4	2-4	Moderate	0.43			
	33-59	---	---	---	---	---	---	----			
	59-69	0-10	6.0-20	0.06-0.10	>8.4	2-4	Low	0.17			
Ocho	0-9	5-10	0.6-2.0	0.14-0.16	7.9-9.0	<2	Low	0.49	1	3	<2
	9-16	15-25	0.06-0.2	0.15-0.17	>8.4	<2	Low	0.43			
	16-34	---	---	---	---	---	---	----			
	34-49	0-5	0.6-2.0	0.14-0.16	7.9-8.4	<2	Low	0.49			
	49-60	0-5	6.0-20	0.06-0.08	7.9-8.4	<2	Low	0.17			
132*:											
Inlow	0-13	10-15	0.6-2.0	0.15-0.17	7.4-8.4	<2	Low	0.49	2	4L	1-2
	13-33	18-35	0.06-0.2	0.14-0.18	>8.4	2-4	Moderate	0.43			
	33-59	---	---	---	---	---	---	----			
	59-69	0-10	6.0-20	0.06-0.10	>8.4	2-4	Low	0.17			
Ocho	0-9	5-10	0.6-2.0	0.14-0.16	7.9-9.0	<2	Low	0.49	1	3	<2
	9-16	15-25	0.06-0.2	0.15-0.17	>8.4	<2	Low	0.43			
	16-34	---	---	---	---	---	---	----			
	34-49	0-5	0.6-2.0	0.14-0.16	7.9-8.4	<2	Low	0.49			
	49-60	0-5	6.0-20	0.06-0.08	7.9-8.4	<2	Low	0.17			
Modoc	0-12	15-25	0.6-2.0	0.14-0.17	6.1-7.8	<2	Low	0.32	2	5	1-2
	12-21	15-25	0.2-0.6	0.14-0.16	6.6-8.4	<2	Moderate	0.32			
	21-34	25-35	0.2-0.6	0.15-0.19	6.6-8.4	<2	Moderate	0.28			
	34-55	---	---	---	---	---	---	----			
	55-60	5-10	0.6-2.0	0.08-0.10	7.4-8.4	<2	Low	0.24			
133 Kalo	0-5	10-20	2.0-6.0	0.07-0.10	5.6-6.5	<2	Low	0.15	2	8	1-3
	5-27	20-32	0.2-0.6	0.05-0.08	5.6-6.5	<2	Moderate	0.10			
	27	---	---	---	---	---	---	----			
134 Kalo	0-5	10-20	2.0-6.0	0.05-0.08	5.6-6.5	<2	Low	0.10	2	8	1-3
	5-27	20-32	0.2-0.6	0.05-0.08	5.6-6.5	<2	Moderate	0.10			
	27	---	---	---	---	---	---	----			
135*:											
Karoc	0-3	10-18	2.0-6.0	0.05-0.08	6.6-7.8	<2	Low	0.05	5	8	1-2
	3-62	10-18	2.0-6.0	0.05-0.08	6.6-7.8	<2	Low	0.05			
Rock outcrop.											
136 Laki	0-12	10-18	0.6-2.0	0.19-0.30	7.9-9.0	4-8	Low	0.24	5	3	1-2
	12-60	18-25	0.6-2.0	0.17-0.30	7.9-9.0	<8	Low	0.32			
137*:											
Laki	0-12	10-18	0.6-2.0	0.19-0.30	7.9-9.0	4-8	Low	0.24	5	3	1-2
	12-60	18-25	0.6-2.0	0.17-0.30	8.5-9.0	<16	Low	0.32			
Henley	0-11	10-18	0.6-2.0	0.06-0.12	>8.4	2-8	Low	0.10	2	3	1-2
	11-25	10-18	0.6-2.0	0.13-0.18	7.9-9.0	2-8	Low	0.37			
	25-31	---	---	---	---	---	---	----			
	31-60	10-27	0.6-6.0	0.13-0.18	7.9-9.0	2-8	Low	0.37			
138 Lalos	0-13	5-15	0.6-2.0	0.15-0.17	7.9-8.4	<4	Low	0.37	5	3	1-3
	13-30	18-30	0.2-0.6	0.14-0.18	>8.4	4-8	Low	0.32			
	30-65	5-15	0.6-2.0	0.09-0.14	>8.4	8-16	Low	0.37			

See footnote at end of table.

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
139*:											
Lalos-----------	0-13	5-15	0.6-2.0	0.15-0.17	7.9-8.4	<4	Low-------	0.37	5	3	1-3
	13-30	18-30	0.2-0.6	0.14-0.18	>8.4	4-8	Low-------	0.32			
	30-65	5-15	0.6-2.0	0.09-0.14	>8.4	8-16	Low-------	0.37			
Blownout land.											
140-------------- Lamath	0-21	---	0.6-2.0	0.40-0.55	7.4-8.4	2-4	Low-------	0.49	5	4L	5-10
	21-53	0-6	6.0-20	0.06-0.08	7.4-8.4	2-4	Low-------	0.20			
	53-60	0-15	2.0-6.0	0.08-0.10	6.1-7.3	2-8	Low-------	0.28			
141, 142--------- Leavers	0-15	8-13	2.0-6.0	0.11-0.13	6.1-7.3	<2	Low-------	0.28	5	3	1-3
	15-25	10-15	2.0-6.0	0.11-0.13	6.1-7.3	<2	Low-------	0.28			
	25-60	0-5	6.0-20	0.03-0.05	6.1-7.3	<2	Low-------	0.10			
143-------------- Lequieu	0-3	20-25	0.6-2.0	0.07-0.10	6.6-7.3	<2	Low-------	0.10	1	8	<1
	3-8	20-25	0.6-2.0	0.07-0.10	6.6-7.3	<2	Low-------	0.10			
	8	---	---	---	---	---	----------	----			
144*:											
Lequieu---------	0-3	20-25	0.6-2.0	0.07-0.10	6.6-7.3	<2	Low-------	0.10	1	8	<1
	3-8	20-25	0.6-2.0	0.07-0.10	6.6-7.3	<2	Low-------	0.10			
	8	---	---	---	---	---	----------	----			
Adieux----------	0-4	10-18	2.0-6.0	0.09-0.12	6.6-7.8	<2	Low-------	0.20	2	8	1-3
	4-32	18-27	0.6-2.0	0.14-0.17	6.6-7.8	<2	Moderate	0.28			
	32	---	---	---	---	---	----------	----			
145*:											
Lorella---------	0-8	12-25	0.6-2.0	0.06-0.10	6.1-7.3	<2	Low-------	0.15	1	8	2-4
	8-11	27-40	0.2-0.6	0.06-0.13	6.6-7.3	<2	Moderate	0.17			
	11-16	35-50	0.06-0.2	0.05-0.07	6.6-7.3	<2	High------	0.15			
	16	---	---	---	---	---	----------	----			
Fiddler---------	0-8	18-27	0.6-2.0	0.11-0.14	6.1-7.3	<2	Low-------	0.20	2	8	1-3
	8-26	35-50	0.06-0.2	0.07-0.10	6.1-7.3	<2	Moderate	0.10			
	26	---	---	---	---	---	----------	----			
146*:											
Madeline--------	0-6	20-27	0.6-2.0	0.08-0.11	6.1-7.3	<2	Low-------	0.10	1	8	1-2
	6-13	40-60	0.06-0.2	0.10-0.13	6.6-7.8	<2	High------	0.15			
	13-16	35-60	0.06-0.2	0.10-0.13	6.6-7.8	<2	High------	0.15			
	16	---	---	---	---	---	----------	----			
Capona----------	0-10	18-27	0.6-2.0	0.12-0.16	6.1-7.3	<2	Low-------	0.20	2	8	1-2
	10-34	18-27	0.6-2.0	0.12-0.16	6.1-7.3	<2	Low-------	0.17			
	34	---	---	---	---	---	----------	----			
147*:											
Mahogan---------	0-13	10-15	0.6-2.0	0.14-0.16	6.6-7.3	<2	Low-------	0.32	2	5	1-2
	13-38	18-25	0.6-2.0	0.10-0.14	6.6-7.3	<2	Low-------	0.20			
	38	---	---	---	---	---	----------	----			
Fredonyer-------	0-10	15-22	0.6-2.0	0.07-0.09	6.1-7.3	<2	Low-------	0.15	2	8	1-3
	10-25	18-25	0.6-2.0	0.07-0.10	6.1-7.3	<2	Low-------	0.15			
	25	---	---	---	---	---	----------	----			
148-------------- Medford	0-6	27-35	0.2-0.6	0.16-0.18	5.6-7.3	<2	Moderate	0.32	5	7	1-4
	6-36	35-45	0.2-0.6	0.14-0.17	5.6-7.3	<2	High------	0.28			
	36-62	20-35	0.2-0.6	0.15-0.17	5.6-7.3	<2	Moderate	0.28			

See footnote at end of table.

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
149-------------- Modoc	0-12	15-25	0.6-2.0	0.14-0.17	6.1-7.8	<2	Low--------	0.32	2	5	1-2
	12-21	15-25	0.2-0.6	0.14-0.16	6.6-8.4	<2	Moderate	0.32			
	21-34	25-35	0.2-0.6	0.15-0.19	6.6-8.4	<2	Moderate	0.28			
	34-55	---	---	---	---	---	-----------	----			
	55-60	5-10	0.6-2.0	0.08-0.10	7.4-8.4	<2	Low--------	0.24			
150-------------- Modoc	0-8	15-25	0.6-2.0	0.14-0.17	6.1-7.3	<2	Low--------	0.32	2	5	1-2
	8-25	25-35	0.2-0.6	0.15-0.19	6.6-8.4	<2	Moderate	0.28			
	25-48	---	---	---	---	---	-----------	----			
	48	---	---	---	---	---	-----------	----			
151*, 152*:											
Mojo------------	0-9	20-25	0.6-2.0	0.11-0.14	5.6-6.5	<2	Low--------	0.24	2	8	1-2
	9-27	27-35	0.2-0.6	0.14-0.16	5.6-6.5	<2	Moderate	0.28			
	27-36	27-35	0.2-0.6	0.09-0.12	5.6-6.5	<2	Moderate	0.15			
	36	---	---	---	---	---	-----------	----			
Pinehurst-------	0-15	15-20	0.6-2.0	0.09-0.11	5.6-6.5	<2	Low--------	0.17	3	8	1-4
	15-42	20-35	0.2-0.6	0.08-0.14	5.1-6.5	<2	Low--------	0.17			
	42-55	20-30	0.2-0.6	0.07-0.11	5.1-6.5	<2	Low--------	0.10			
	55	---	---	---	---	---	-----------	----			
153-------------- Mudco	0-7	5-10	2.0-6.0	0.09-0.11	6.6-7.3	<2	Low--------	0.20	1	5	1-2
	7-10	10-15	2.0-6.0	0.10-0.12	6.6-7.3	<2	Low--------	0.28			
	10-17	20-25	0.2-0.6	0.12-0.14	6.6-7.3	<2	Moderate	0.24			
	17-60	---	---	---	---	---	-----------	----			
154-------------- Munnell	0-5	10-15	0.6-2.0	0.13-0.15	6.1-7.3	<2	Low--------	0.20	5	5	1-2
	5-32	18-30	0.6-2.0	0.13-0.16	6.6-7.8	<2	Low--------	0.20			
	32-60	0-5	6.0-20	0.03-0.06	7.4-7.8	<2	Low--------	0.10			
155-------------- Munnell	0-5	10-15	0.6-2.0	0.13-0.15	6.1-7.3	<2	Low--------	0.17	5	5	1-2
	5-32	18-30	0.6-2.0	0.13-0.16	6.6-7.8	<2	Low--------	0.17			
	32-60	0-5	6.0-20	0.03-0.06	7.4-7.8	<2	Low--------	0.05			
156-------------- Ocho Variant	0-6	20-27	0.6-2.0	0.15-0.17	7.9-8.4	2-4	Moderate	0.49	1	4L	5-1
	6-19	40-60	0.06-0.2	0.12-0.15	8.5-9.0	4-8	High-------	0.28			
	19-60	---	---	---	---	---	-----------	----			
157-------------- Orset	0-13	10-18	2.0-6.0	0.09-0.11	5.6-6.5	<2	Low--------	0.24	5	8	<1
	13-60	10-18	0.2-0.6	0.09-0.16	5.6-6.5	<2	Low--------	0.32			
158*:											
Pinehurst-------	0-15	15-20	0.6-2.0	0.09-0.11	5.6-6.5	<2	Low--------	0.17	3	8	1-4
	15-42	20-35	0.2-0.6	0.08-0.14	5.1-6.5	<2	Low--------	0.17			
	42-55	20-30	0.2-0.6	0.07-0.11	5.1-6.5	<2	Low--------	0.10			
	55	---	---	---	---	---	-----------	----			
Kalo------------	0-5	10-20	2.0-6.0	0.07-0.10	5.6-6.5	<2	Low--------	0.15	2	8	1-3
	5-27	20-32	0.2-0.6	0.05-0.08	5.6-6.5	<2	Moderate	0.10			
	27	---	---	---	---	---	-----------	----			
159-------------- Pit	0-26	40-60	0.06-0.2	0.14-0.16	6.6-7.8	<2	High-------	0.32	5	8	1-4
	26-31	30-40	0.06-0.2	0.16-0.19	7.4-8.4	<4	Moderate	0.37			
	31-60	20-27	0.2-0.6	0.15-0.17	7.4-8.4	<4	Low--------	0.43			
160-------------- Podus	0-18	5-10	2.0-6.0	0.09-0.11	7.9-8.4	<2	Low--------	0.20	2	2	<1
	18-34	---	---	---	---	---	-----------	----			
	34-60	5-15	2.0-6.0	0.10-0.12	7.9-8.4	<2	Low--------	0.28			

See footnote at end of table.

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
161	0-12	5-10	2.0-6.0	0.09-0.14	>7.8	<2	Low	0.17	2	2	1-3
Poe	12-32	7-10	2.0-6.0	0.09-0.14	>7.8	<2	Low	0.17			
	32-60	---	---	---	---	---	---	---			
162	0-29	0-5	6.0-20	0.08-0.10	6.6-8.4	<2	Low	0.20	2	2	<.5
Poman	29-39	---	---	---	---	---	---	---			
	39-60	0-2	6.0-20	0.05-0.07	7.4-8.4	<4	Low	0.15			
163*:											
Rangee Variant	0-3	30-40	0.2-0.6	0.17-0.18	6.6-7.3	<2	Moderate	0.28	2	4	1-2
	3-16	40-55	0.06-0.2	0.12-0.15	7.4-8.4	<2	High	0.32			
	16-35	---	---	---	---	---	---	---			
	35-60	10-20	2.0-6.0	0.10-0.12	7.9-8.4	2-4	Low	0.20			
Dotta	0-15	10-20	0.6-2.0	0.11-0.13	6.1-7.3	<2	Low	0.28	5	3	1-3
	15-30	18-27	0.2-0.6	0.13-0.16	5.6-7.3	<2	Low	0.37			
	30-60	5-15	2.0-6.0	0.09-0.11	5.6-7.3	<2	Low	0.20			
164, 165	0-13	8-15	2.0-6.0	0.10-0.12	6.6-7.3	<2	Low	0.28	2	3	1-2
Rojo	13-28	8-15	2.0-6.0	0.10-0.13	6.6-7.8	<2	Low	0.28			
	28-30	---	---	---	---	---	---	---			
	30	---	---	---	---	---	---	---			
166*. Rubble land											
167*:											
Salisbury	0-9	20-27	0.6-2.0	0.10-0.12	6.6-7.8	<2	Low	0.32	2	7	1-2
	9-23	35-50	0.06-0.2	0.12-0.15	6.6-8.4	<2	High	0.24			
	23-60	---	---	---	---	---	---	---			
Denbar	0-8	27-35	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.24	3	8	1-3
	8-29	35-50	0.06-0.2	0.13-0.19	7.4-8.4	<2	High	0.20			
	29-48	10-20	2.0-6.0	0.09-0.12	7.9-8.4	<2	Low	0.28			
	48-60	---	---	---	---	---	---	---			
168*, 169*:											
Searles	0-10	20-27	0.6-2.0	0.10-0.15	6.1-7.8	<2	Low	0.15	2	8	1-2
	10-28	25-35	0.2-0.6	0.07-0.10	6.6-7.8	<2	Low	0.10			
	28	---	---	---	---	---	---	---			
Dunnlake	0-4	18-27	0.6-2.0	0.08-0.11	6.1-7.3	<2	Low	0.15	1	8	1-2
	4-7	27-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate	0.32			
	7-16	35-50	0.06-0.2	0.12-0.14	6.6-7.8	<2	High	0.15			
	16	---	---	---	---	---	---	---			
170*, 171*:											
Searles	0-10	20-27	0.6-2.0	0.10-0.15	6.1-7.8	<2	Low	0.15	2	8	1-2
	10-28	25-35	0.2-0.6	0.07-0.10	6.6-7.8	<2	Low	0.10			
	28	---	---	---	---	---	---	---			
Orhood	0-4	10-15	0.6-2.0	0.07-0.10	6.6-7.3	<2	Low	0.10	1	8	1-3
	4-8	18-27	0.6-2.0	0.07-0.10	6.6-7.3	<2	Low	0.10			
	8-16	18-32	0.2-0.6	0.07-0.11	6.6-7.3	<2	Low	0.10			
	16	---	---	---	---	---	---	---			
172*:											
Searles	0-10	20-27	0.6-2.0	0.10-0.15	6.1-7.8	<2	Low	0.15	2	8	1-2
	10-28	25-35	0.2-0.6	0.07-0.10	6.6-7.8	<2	Low	0.10			
	28	---	---	---	---	---	---	---			

See footnote at end of table.

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
172*: Rubble land.											
173*:											
Searles----------	0-10	20-27	0.6-2.0	0.10-0.15	6.1-7.8	<2	Low--------	0.15	2	8	1-2
	10-28	25-35	0.2-0.6	0.07-0.10	6.6-7.8	<2	Low--------	0.10			
	28	---	---	---	---	---	----------	----			
Truax------------	0-8	10-15	2.0-6.0	0.09-0.12	6.1-7.3	<2	Low--------	0.32	5	3	1-3
	8-29	20-25	0.2-0.6	0.14-0.17	6.1-7.3	<2	Low--------	0.28			
	29-36	10-15	2.0-6.0	0.09-0.12	6.6-7.8	<2	Low--------	0.24			
	36-60	10-15	0.6-2.0	0.08-0.11	6.6-7.8	<2	Low--------	0.24			
Orhood-----------	0-4	10-15	0.6-2.0	0.07-0.10	6.6-7.3	<2	Low--------	0.10	1	8	1-3
	4-8	18-27	0.6-2.0	0.07-0.10	6.6-7.3	<2	Low--------	0.10			
	8-16	18-32	0.2-0.6	0.07-0.11	6.6-7.3	<2	Low--------	0.10			
	16	---	---	---	---	---	----------	----			
174-------------- Searles Variant	0-8	18-27	0.6-2.0	0.08-0.10	6.6-8.4	<2	Low--------	0.10	3	8	1-2
	8-16	18-27	0.6-2.0	0.08-0.10	6.6-8.4	<2	Low--------	0.10			
	16-45	35-50	0.06-0.2	0.08-0.13	6.6-8.4	<2	Moderate	0.05			
	45	---	---	---	---	---	----------	----			
175-------------- Sheld	0-9	5-10	2.0-6.0	0.11-0.14	5.1-6.5	<2	Low--------	0.20	3	8	1-4
	9-17	5-10	2.0-6.0	0.11-0.14	5.1-6.5	<2	Low--------	0.20			
	17-24	6-12	0.6-2.0	0.07-0.09	5.6-6.5	<2	Low--------	0.10			
	24-44	10-20	0.6-2.0	0.07-0.09	5.1-6.5	<2	Low--------	0.10			
	44	---	---	---	---	---	----------	----			
176-------------- Sheld	0-9	5-10	2.0-6.0	0.06-0.10	5.1-6.5	<2	Low--------	0.10	3	8	1-4
	9-17	5-10	2.0-6.0	0.11-0.14	5.1-6.5	<2	Low--------	0.20			
	17-24	6-12	0.6-2.0	0.07-0.09	5.6-6.5	<2	Low--------	0.10			
	24-44	10-20	0.6-2.0	0.07-0.09	5.1-6.5	<2	Low--------	0.10			
	44	---	---	---	---	---	----------	----			
177-------------- Snell	0-4	25-27	0.6-2.0	0.08-0.12	5.6-7.3	<2	Low--------	0.17	2	8	2-4
	4-21	35-50	0.2-0.6	0.06-0.10	5.6-7.3	<2	High-------	0.10			
	21	---	---	---	---	---	----------	----			
178-------------- Stukel	0-6	10-18	0.6-2.0	0.12-0.14	6.6-7.3	<2	Low--------	0.24	1	3	1-3
	6-17	10-18	0.6-2.0	0.11-0.19	6.6-7.8	<2	Low--------	0.24			
	17	---	---	---	---	---	----------	----			
179*:											
Stukel-----------	0-6	10-18	0.6-2.0	0.12-0.14	6.6-7.3	<2	Low--------	0.24	1	3	1-3
	6-17	10-18	0.6-2.0	0.11-0.19	6.6-7.8	<2	Low--------	0.24			
	17	---	---	---	---	---	----------	----			
Capona-----------	0-10	10-20	0.6-2.0	0.14-0.18	6.1-7.3	<2	Low--------	0.24	2	3	1-2
	10-34	18-27	0.6-2.0	0.13-0.21	6.1-7.3	<2	Low--------	0.17			
	34	---	---	---	---	---	----------	----			
180-------------- Teeters	0-10	10-15	0.06-0.2	0.39-0.55	>7.8	<16	Low--------	0.43	5	4L	3-5
	10-60	10-15	0.06-0.2	0.39-0.55	>7.8	<16	Low--------	0.49			
181-------------- Truax	0-8	10-15	2.0-6.0	0.09-0.12	6.1-7.3	<2	Low--------	0.32	5	3	1-3
	8-29	20-25	0.2-0.6	0.14-0.17	6.1-7.3	<2	Low--------	0.28			
	29-36	10-15	2.0-6.0	0.09-0.12	6.6-7.8	<2	Low--------	0.24			
	36-60	10-15	0.6-2.0	0.08-0.11	6.6-7.8	<2	Low--------	0.24			

See footnote at end of table.

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
182*:											
Truax-----------	0-8	10-15	2.0-6.0	0.09-0.12	6.1-7.3	<2	Low--------	0.32	5	3	1-3
	8-29	20-25	0.2-0.6	0.14-0.17	6.1-7.3	<2	Low--------	0.28			
	29-36	10-15	2.0-6.0	0.09-0.12	6.6-7.8	<2	Low--------	0.24			
	36-60	10-15	2.0-0.6	0.09-0.12	6.6-7.8	<2	Low--------	0.24			
Searles---------	0-10	20-27	0.6-2.0	0.10-0.15	6.1-7.8	<2	Low--------	0.15	2	8	1-2
	10-28	25-35	0.2-0.6	0.07-0.10	6.6-7.8	<2	Low--------	0.10			
	28	---	---	---	---	---	-----------	----			
183-------------- Tulana	0-12	10-20	0.2-0.6	0.39-0.55	6.1-7.8	<2	Low--------	0.43	5	5	5-10
	12-41	10-30	0.2-0.6	0.39-0.55	4.5-6.5	<2	Low--------	0.43			
	41-60	12-20	0.2-6.0	0.10-0.55	4.5-6.5	<2	Low--------	0.32			
184-------------- Tulana Variant	0-22	---	6.0-20	0.20-0.30	5.1-7.3	<2	Low--------	----	---	8	25-70
	22-60	5-10	0.6-2.0	0.40-0.55	4.5-8.4	<2	Low--------	0.43			
185-------------- Tulebasin	0-14	30-40	0.2-0.6	0.30-0.50	6.6-8.4	<2	Moderate	0.32	5	4	10-15
	14-32	40-50	0.06-2.0	0.30-0.50	7.4-8.4	2-8	Moderate	0.32			
	32-60	30-50	0.06-2.0	0.30-0.50	7.4-8.4	2-8	Moderate	0.32			
186-------------- Zanbur	0-8	10-18	2.0-6.0	0.10-0.12	7.4-8.4	<2	Low--------	0.20	5	3	2-5
	8-20	0-10	6.0-20	0.07-0.10	7.4-8.4	<2	Low--------	0.15			
	20-60	10-18	0.6-2.0	0.39-0.55	7.4-8.4	2-8	Low--------	0.43			
187-------------- Zuman	0-4	5-10	6.0-20	0.02-0.05	>8.4	2-16	Low--------	0.20	3	2	1-2
	4-14	20-40	0.06-2.0	0.05-0.10	>8.4	2-16	Moderate	0.43			
	14-60	5-10	6.0-20	0.06-0.08	>8.4	<4	Low--------	0.20			
188-------------- Zuman	0-4	20-25	0.6-2.0	0.05-0.10	>8.4	2-16	Low--------	0.43	3	4L	1-2
	4-14	20-40	0.06-2.0	0.05-0.10	>8.4	2-16	Moderate	0.43			
	14-60	5-10	6.0-20	0.06-0.08	>8.4	<4	Low--------	0.20			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 20.--WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
101: Avis	A	None	---	---	>6.0	---	---
102: Capjac	C	Rare	---	---	1.5-3.0	Apparent	Jan-Dec
103: Capjac	C	None	---	---	+2-0	Perched	Jan-Dec
104: Capona	C	None	---	---	>6.0	---	---
105*:							
Capona	C	None	---	---	>6.0	---	---
Rock outcrop.							
106, 107: Dehill	B	None	---	---	>6.0	---	---
108: Demox	B	None	---	---	>6.0	---	---
109*:							
Demox	B	None	---	---	>6.0	---	---
Rubble land.							
110: Doel	C	None	---	---	>6.0	---	---
111: Dotta	B	None	---	---	>6.0	---	---
112*, 113*:							
Dunnlake	D	None	---	---	>6.0	---	---
Bucklake	C	None	---	---	>6.0	---	---
114*:							
Dunnlake	D	None	---	---	>6.0	---	---
Bucklake	C	None	---	---	>6.0	---	---
Lequieu	D	None	---	---	>6.0	---	---
115*:							
Dunnlake	D	None	---	---	>6.0	---	---
Lequieu	D	None	---	---	>6.0	---	---
116*:							
Dunnlake	D	None	---	---	>6.0	---	---
Rangee	D	None	---	---	>6.0	---	---

See footnote at end of table.

TABLE 20.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
117 Eastable	B	None	---	---	>6.0	---	---
118*:							
Eastable	B	None	---	---	>6.0	---	---
Hedox	C	None	---	---	>6.0	---	---
119 Esro	D	Frequent	Very long	Jan-Jun	0-1.0	Apparent	Dec-Aug
120 Esro	C	Rare	---	---	2.0-4.0	Apparent	Dec-Jul
121 Forbar	D	Rare	---	---	1.5-3.0	Apparent	Jan-Dec
122, 123 Fordney	A	None	---	---	>6.0	---	---
124 Fordney	C	None	---	---	2.0-6.0	Apparent	Mar-Sep
125*:							
Fredonyer	C	None	---	---	>6.0	---	---
Mahogan	C	None	---	---	>6.0	---	---
126*:							
Fredonyer	C	None	---	---	>6.0	---	---
Rock outcrop.							
127*, 128*, 129*:							
Hedox	C	None	---	---	>6.0	---	---
Porterfield	C	None	---	---	>6.0	---	---
130*:							
Inlow	C	None	---	---	3.0-6.0	Apparent	Jan-Mar
Modoc	C	None	---	---	>6.0	---	---
131*:							
Inlow	C	None	---	---	3.0-6.0	Apparent	Jan-Mar
Ocho	D	None	---	---	+0.5-1.0	Perched	Dec-Mar
132*:							
Inlow	C	None	---	---	3.0-6.0	Apparent	Jan-Mar
Ocho	D	None	---	---	+0.5-1.0	Perched	Dec-Mar
Modoc	C	None	---	---	>6.0	---	---
133, 134 Kalo	C	None	---	---	>6.0	---	---
135*:							
Karoc	B	None	---	---	>6.0	---	---

See footnote at end of table.

TABLE 20.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
135*:							
Rock outcrop.							
136-----Laki	B	Rare-----	---	---	3.0-5.0	Apparent	Mar-Sep
137*:							
Laki-----	B	Rare-----	---	---	3.0-5.0	Apparent	Mar-Sep
Henley-----	C	Rare-----	---	---	1.0-3.5	Apparent	Mar-Sep
138-----Lalos	B	None-----	---	---	>6.0	---	---
139*:							
Lalos-----	B	None-----	---	---	>6.0	---	---
Blownout land.							
140-----Lamath	D	Rare-----	---	---	1.5-3.0	Apparent	Jan-Dec
141-----Leavers	B	None-----	---	---	3.5-6.0	Perched	Dec-Mar
142-----Leavers	B	None-----	---	---	>6.0	---	---
143-----Lequieu	D	None-----	---	---	>6.0	---	---
144*:							
Lequieu-----	D	None-----	---	---	>6.0	---	---
Adieux-----	B	None-----	---	---	>6.0	---	---
145*:							
Lorella-----	D	None-----	---	---	>6.0	---	---
Fiddler-----	C	None-----	---	---	>6.0	---	---
146*:							
Madeline-----	D	None-----	---	---	>6.0	---	---
Capona-----	C	None-----	---	---	>6.0	---	---
147*:							
Mahogan-----	C	None-----	---	---	>6.0	---	---
Fredonyer-----	C	None-----	---	---	>6.0	---	---
148-----Medford	B	None-----	---	---	>6.0	---	---
149, 150-----Modoc	C	None-----	---	---	>6.0	---	---
151*, 152*:							
Mojo-----	C	None-----	---	---	>6.0	---	---
Pinehurst-----	B	None-----	---	---	>6.0	---	---

See footnote at end of table.

TABLE 20.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
153-------- Mudco	D	None----------	---	---	>6.0	---	---
154-------- Munnell	B	None----------	---	---	>6.0	---	---
155-------- Munnell	B	None----------	---	---	3.5-6.0	Apparent	Jan-Apr
156-------- Ocho Variant	D	None----------	---	---	+.5-1.0	Perched	Dec-Mar
157-------- Orset	B	None----------	---	---	>6.0	---	---
158*:							
Pinehurst--------	B	None----------	---	---	>6.0	---	---
Kalo--------	C	None----------	---	---	>6.0	---	---
159-------- Pit	D	Occasional------	Brief to long	Jan-May	5.0-6.0	Apparent	Dec-May
160-------- Podus	C	None----------	---	---	1.5-4.0	Perched	May-Sep
161-------- Poe	C	None----------	---	---	2.0-4.0	Apparent	May-Sep
162-------- Poman	C	None----------	---	---	>6.0	---	---
163*:							
Rangee Variant--------	C	None----------	---	---	+0.5-1.0	Perched	Dec-Mar
Dotta--------	B	None----------	---	---	>6.0	---	---
164, 165-------- Rojo	C	None----------	---	---	>6.0	---	---
166*. Rubble land							
167*:							
Salisbury--------	C	None----------	---	---	>6.0	---	---
Denbar--------	C	None----------	---	---	>6.0	---	---
168*, 169*:							
Searles--------	C	None----------	---	---	>6.0	---	---
Dunnlake--------	D	None----------	---	---	>6.0	---	---
170*, 171*:							
Searles--------	C	None----------	---	---	>6.0	---	---
Orhood--------	D	None----------	---	---	>6.0	---	---
172*:							
Searles--------	C	None----------	---	---	>6.0	---	---

See footnote at end of table.

TABLE 20.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
172*:							
Rubble land.							
173*:							
Searles	C	None	---	---	>6.0	---	---
Truax	B	None	---	---	>6.0	---	---
Orhood	D	None	---	---	>6.0	---	---
174 Searles Variant	C	None	---	---	>6.0	---	---
175, 176 Sheld	B	None	---	---	>6.0	---	---
177 Snell	C	None	---	---	>6.0	---	---
178 Stukel	D	None	---	---	>6.0	---	---
179*:							
Stukel	D	None	---	---	>6.0	---	---
Capona	C	None	---	---	>6.0	---	---
180 Teeters	C	Rare	---	---	2.0-4.0	Apparent	Jan-Dec
181 Truax	B	None	---	---	>6.0	---	---
182*:							
Truax	B	None	---	---	>6.0	---	---
Searles	C	None	---	---	>6.0	---	---
183 Tulana	C	None	---	---	2.0-5.0	Apparent	Jan-Dec
184 Tulana Variant	D	Rare	---	---	0-1.5	Apparent	Jan-Dec
185 Tulebasin	D	Rare	---	---	1.5-3.0	Perched	Jan-Dec
186 Zanbur	B	None	---	---	3.5-5.0	Perched	Mar-Sep
187 Zuman	C/D	Rare	---	---	0-4.0	Apparent	Jan-Dec
188 Zuman	D	None	---	---	+0.5-0.5	Apparent	Dec-Apr

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 21.--SOIL FEATURES

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
	In		In				
101----- Avis	>60	---	---	---	Moderate	Moderate	Moderate.
102----- Capjac	>60	---	---	---	Moderate	Moderate	Low.
103----- Capjac	>60	---	---	---	Low	Moderate	Low.
104----- Capona	20-40	Hard	---	---	Moderate	Moderate	Low.
105*:							
Capona	20-40	Hard	---	---	Moderate	Moderate	Low.
Rock outcrop.							
106, 107----- Dehill	>60	---	---	---	Moderate	Moderate	Low.
108----- Demox	>60	---	---	---	Moderate	High	Low.
109*:							
Demox	>60	---	---	---	Moderate	High	Low.
Rubble land.							
110----- Doel	>60	---	20-40	Thick	Moderate	High	Low.
111----- Dotta	>60	---	---	---	---	Moderate	Moderate.
112*, 113*:							
Dunnlake	12-20	Hard	---	---	Low	Moderate	Low.
Bucklake	20-40	Hard	---	---	Low	Moderate	Low.
114*:							
Dunnlake	12-20	Hard	---	---	Low	Moderate	Low.
Bucklake	20-40	Hard	---	---	Low	Moderate	Low.
Lequieu	6-10	Hard	---	---	Moderate	Moderate	Low.
115*:							
Dunnlake	12-20	Hard	---	---	Low	Moderate	Low.
Lequieu	6-10	Hard	---	---	Moderate	Moderate	Low.
116*:							
Dunnlake	12-20	Hard	---	---	Low	Moderate	Low.
Rangee	21-46	Hard	20-40	Thick	---	Moderate	Low.

See footnote at end of table.

TABLE 21.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
	In		In				
117 Eastable	>60	---	---	---	Moderate	High	Low.
118*:							
Eastable	>60	---	---	---	Moderate	High	Low.
Hedox	20-40	Soft	---	---	Moderate	Moderate	Low.
119 Esro	>60	---	---	---	High	High	Moderate.
120 Esro	>60	---	---	---	High	High	Low.
121 Forbar	>60	---	---	---	Low	High	Low.
122, 123, 124 Fordney	>60	---	---	---	Low	Moderate	Low.
125*:							
Fredonyer	20-40	Hard	---	---	Low	Moderate	Low.
Mahogan	30-40	Hard	---	---	Moderate	Moderate	Low.
126*:							
Fredonyer	20-40	Hard	---	---	Low	Moderate	Low.
Rock outcrop.							
127*, 128*, 129*:							
Hedox	20-40	Soft	---	---	Moderate	Moderate	Low.
Porterfield	14-20	Soft	---	---	Moderate	Moderate	Low.
130*:							
Inlow	>60	---	20-40	Thick	Moderate	High	Low.
Modoc	>60	---	20-40	Thick	Moderate	High	Low.
131*:							
Inlow	>60	---	20-40	Thick	Moderate	High	Low.
Ocho	>60	---	14-20	Thick	Moderate	High	Low.
132*:							
Inlow	>60	---	20-40	Thick	Moderate	High	Low.
Ocho	>60	---	14-20	Thick	Moderate	High	Low.
Modoc	>60	---	20-40	Thick	Moderate	High	Low.
133, 134 Kalo	20-40	Hard	---	---	Moderate	Moderate	Moderate.
135*:							
Karoc	>60	---	---	---	Moderate	High	Low.
Rock outcrop.							

See footnote at end of table.

TABLE 21.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
	In		In				
136 Laki	>60	---	---	---	Moderate	High	Low.
137*:							
Laki	>60	---	---	---	Moderate	High	Low.
Henley	>60	---	20-40	Thick	High	High	Low.
138 Lalos	>60	---	---	---	Moderate	High	Low.
139*:							
Lalos	>60	---	---	---	Moderate	High	Low.
Blownout land.							
140 Lamath	>60	---	---	---	High	High	Low.
141, 142 Leavers	>60	---	---	---	Moderate	Moderate	Low.
143 Lequieu	6-10	Hard	---	---	Moderate	Moderate	Low.
144*:							
Lequieu	6-10	Hard	---	---	Moderate	Moderate	Low.
Adieux	20-40	Hard	---	---	Moderate	High	Low.
145*:							
Lorella	10-20	Hard	---	---	Moderate	Moderate	Low.
Fiddler	20-40	Hard	---	---	Low	High	Low.
146*:							
Madeline	10-20	Hard	---	---	Low	High	Low.
Capona	20-40	Hard	---	---	Moderate	Moderate	Low.
147*:							
Mahogan	30-40	Hard	---	---	Moderate	Moderate	Low.
Fredonyer	20-40	Hard	---	---	Moderate	Moderate	Low.
148 Medford	>60	---	---	---	Moderate	Moderate	Moderate.
149 Modoc	>60	---	20-40	Thick	Moderate	High	Low.
150 Modoc	40-60	Hard	20-40	Thick	Moderate	High	Low.
151*, 152*:							
Mojo	30-40	Hard	---	---	Moderate	Moderate	Moderate.
Pinehurst	40-60	Soft	---	---	Moderate	Moderate	Moderate.

See footnote at end of table.

TABLE 21.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
	In		In				
153-------------------- Mudco	>60	---	10-20	Thick	Low-----------	Low-----------	Low.
154, 155--------------- Munnell	>60	---	---	---	Moderate-------	Moderate-------	Low.
156-------------------- Ocho Variant	>60	---	14-20	Thick	Moderate-------	High-----------	Low.
157-------------------- Orset	>60	---	---	---	Moderate-------	Moderate-------	Moderate.
158*:							
Pinehurst--------------	40-60	Soft	---	---	Moderate-------	Moderate-------	Moderate.
Kalo-------------------	20-40	Hard	---	---	Moderate-------	Moderate-------	Moderate.
159-------------------- Pit	>60	---	---	---	High-----------	High-----------	Low.
160-------------------- Podus	>60	---	10-20	Thick	Low-----------	High-----------	Low.
161-------------------- Poe	>60	---	20-40	Thick	Low-----------	High-----------	Low.
162-------------------- Poman	>60	---	20-40	Thick	Low-----------	High-----------	Low.
163*:							
Rangee Variant---------	>60	---	12-20	Thick	Moderate-------	High-----------	Low.
Dotta------------------	>60	---	---	---	---	Moderate-------	Moderate.
164, 165--------------- Rojo	26-44	Soft	25-40	Thin	Moderate-------	Moderate-------	Low.
166*. Rubble land							
167*:							
Salisbury--------------	>60	---	20-40	Thick	Moderate-------	High-----------	Low.
Denbar-----------------	>60	---	40-60	Thick	Moderate-------	High-----------	Low.
168*, 169*:							
Searles----------------	20-40	Hard	---	---	Moderate-------	Moderate-------	Low.
Dunnlake---------------	12-20	Hard	---	---	Low-----------	Moderate-------	Low.
170*, 171*:							
Searles----------------	20-40	Hard	---	---	Moderate-------	Moderate-------	Low.
Orhood-----------------	14-20	Hard	---	---	Moderate-------	Moderate-------	Low.
172*:							
Searles----------------	20-40	Hard	---	---	Moderate-------	Moderate-------	Low.
Rubble land.							

See footnote at end of table.

TABLE 21.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
	In		In				
173*:							
Searles	20-40	Hard	---	---	Moderate	Moderate	Low.
Truax	>60	---	---	---	Moderate	Moderate	Low.
Orhood	14-20	Hard	---	---	Moderate	Moderate	Low.
174 Searles Variant	40-60	Hard	---	---	Moderate	High	Low.
175, 176 Sheld	40-60	Soft	---	---	Moderate	Moderate	Moderate.
177 Snell	20-40	Hard	---	---	Moderate	Moderate	Moderate.
178 Stukel	10-20	Hard	---	---	Moderate	Moderate	Low.
179*:							
Stukel	10-20	Hard	---	---	Moderate	Moderate	Low.
Capona	20-40	Hard	---	---	Moderate	Moderate	Low.
180 Teeters	>60	---	---	---	High	High	Low.
181 Truax	>60	---	---	---	Moderate	Moderate	Low.
182*:							
Truax	>60	---	---	---	Moderate	Moderate	Low.
Searles	20-40	Hard	---	---	Moderate	Moderate	Low.
183 Tulana	>60	---	---	---	High	High	High.
184 Tulana Variant	>60	---	---	---	---	High	High.
185 Tulebasin	>60	---	---	---	Moderate	High	Low.
186 Zanbur	>60	---	---	---	Low	High	Low.
187 Zuman	>60	---	---	---	Moderate	High	Low.
188 Zuman	>60	---	---	---	Moderate	High	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 22.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil in one or more of the map units is a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series)

Soil name	Family or higher taxonomic class
Adieux	Fine-loamy, mixed, mesic Pachic Argixerolls
Avis	Ashy-skeletal, frigid Dystric Xerorthents
Bucklake	Fine, montmorillonitic, mesic Aridic Argixerolls
Capjac	Medial, mixed (calcareous), mesic Mollic Andaquepts
*Capona	Fine-loamy, mixed, mesic Aridic Haploxerolls
Dehill	Coarse-loamy, mixed, mesic Pachic Haploxerolls
Demox	Loamy-skeletal, mixed, mesic Pachic Haploxerolls
Denbar	Fine, montmorillonitic, mesic Pachic Argixerolls
Doel	Coarse-loamy, mixed, mesic Xerollic Durorthids
*Dotta	Fine-loamy, mixed, mesic Pachic Argixerolls
Dunnlake	Clayey, montmorillonitic, mesic Lithic Argixerolls
Eastable	Fine-loamy, mixed, mesic Xerollic Camborthids
Esro	Fine-silty, mixed, frigid Cumulic Haplaquolls
Fiddler	Clayey-skeletal, montmorillonitic, mesic Typic Argixerolls
Forbar	Mixed, mesic Typic Psammaquents
Fordney	Sandy, mixed, mesic Torripsammentic Haploxerolls
Fredonyer	Loamy-skeletal, mixed, frigid Pachic Haploxerolls
Hedox	Fine-loamy, mixed, nonacid, mesic Xeric Torriorthents
Henley	Coarse-loamy, mixed, mesic Aquic Durorthids
Inlow	Fine-loamy, mixed, mesic Haploxerollic Nadurargids
Kalo	Loamy-skeletal, mixed, frigid Ultic Argixerolls
Karoc	Loamy-skeletal, mixed, nonacid, mesic Xeric Torriorthents
Laki	Fine-loamy, mixed, mesic Typic Haploxerolls
Lalos	Coarse-silty, mixed, mesic Xerollic Camborthids
Lamath	Medial over sandy or sandy-skeletal, mixed (calcareous), mesic Haplic Andaquepts
Leavers	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Aridic Haploxerolls
Lequieu	Loamy-skeletal, mixed, nonacid, mesic Lithic Xeric Torriorthents
Lorella	Clayey-skeletal, montmorillonitic, mesic Lithic Argixerolls
Madeline	Clayey, montmorillonitic, frigid Lithic Argixerolls
Mahogan	Fine-loamy, mixed, frigid Pachic Argixerolls
Medford	Fine, montmorillonitic, mesic Pachic Argixerolls
Modoc	Fine-loamy, mixed, mesic Aridic Durixerolls
Mojo	Fine-loamy, mixed, frigid Ultic Argixerolls
Mudco	Loamy, mixed, mesic, shallow Aridic Durixerolls
Munnell	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Aridic Argixerolls
Ocho	Loamy, mixed, mesic, shallow Haplic Nadurargids
Ocho Variant	Clayey, montmorillonitic, mesic, shallow Haplic Nadurargids
Orhood	Loamy-skeletal, mixed, mesic Lithic Argixerolls
Orset	Coarse-loamy, mixed, nonacid, frigid Typic Xerorthents
Pinehurst	Fine-loamy, mixed, frigid Pachic Ultic Argixerolls
*Pit	Fine, montmorillonitic, mesic Chromic Pelloxererts
Podus	Sandy, mixed, mesic, shallow Typic Durochrepts
Poe	Sandy, mixed, mesic Typic Durochrepts
Poman	Sandy, mixed, mesic Xerollic Durorthids
Porterfield	Loamy, mixed, nonacid, mesic, shallow Xeric Torriorthents
Rangee	Very fine, montmorillonitic, mesic Abruptic Aridic Durixerolls
Rangee Variant	Clayey, montmorillonitic, mesic, shallow Typic Durixerolls
Rojo	Coarse-loamy, mixed, mesic Orthidic Durixerolls
Salisbury	Fine, montmorillonitic, mesic Typic Durixerolls
*Searles	Loamy-skeletal, mixed, mesic Aridic Argixerolls
Searles Variant	Clayey-skeletal, montmorillonitic, mesic Aridic Argixerolls
Sheld	Medial-skeletal, frigid Andic Xerumbrepts
Snell	Clayey-skeletal, montmorillonitic, frigid Pachic Argixerolls
Stukel	Loamy, mixed, mesic Lithic Haploxerolls
Teeters	Medial, calcareous, mesic Mollic Halaquepts
Truax	Fine-loamy, mixed, mesic Aridic Argixerolls
Tulana	Medial, nonacid, mesic Mollic Andaquepts
Tulana Variant	Diatomaceous, euic, mesic Limnic Medifibrists

TABLE 22.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Tulebasin	Fine, mixed, mesic Andaqueptic Haplaquolls
Zanbur	Sandy over loamy, mixed, mesic Entic Haploxerolls
Zuman	Fine-loamy over sandy or sandy-skeletal, mixed (calcareous), mesic Typic Halaquepts

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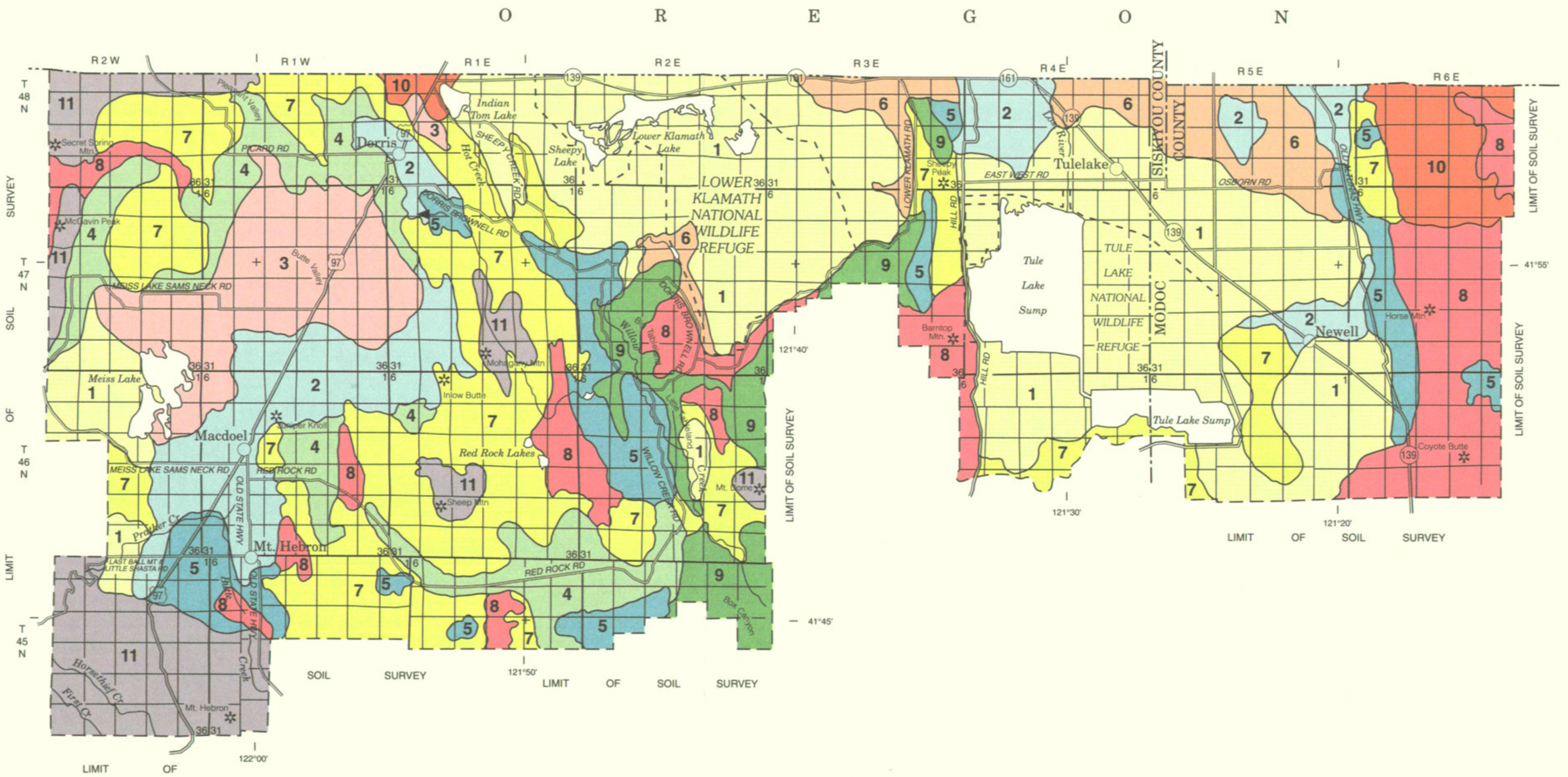


SOIL LEGEND*

MESIC SOILS IN VALLEYS AND BASINS

- 1 Capjac-Tulebasin-Lamath
- 2 Poman-Fordney
- 3 Inlow-Ocho
- 4 Modoc-Rojo
- 5 Truax-Dehill-Eastable
- 6 Laki-Lalos

MESIC SOILS ON THE LOWER FOOTHILLS OF THE CASCADE MOUNTAIN RANGE

- 7 Searles-Orhood
- 8 Dunnlake-Lequieu
- 9 Stukel-Capona-Hedox
- 10 Lorella-Fiddler

FRIGID SOILS OF THE CASCADE MOUNTAIN RANGE

- 11 Kalo-Pinehurst-Mojo

* The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1985

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
REGENTS OF THE UNIVERSITY OF CALIFORNIA (AGRICULTURAL EXPERIMENT STATION)
UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE
CALIFORNIA DEPARTMENT OF FORESTRY, SOIL VEGETATION SURVEY

GENERAL SOIL MAP

BUTTE VALLEY-TULE LAKE AREA, CALIFORNIA
PARTS OF SISKIYOU AND MODOC COUNTIES

N

SECTIONALIZED TOWNSHIP

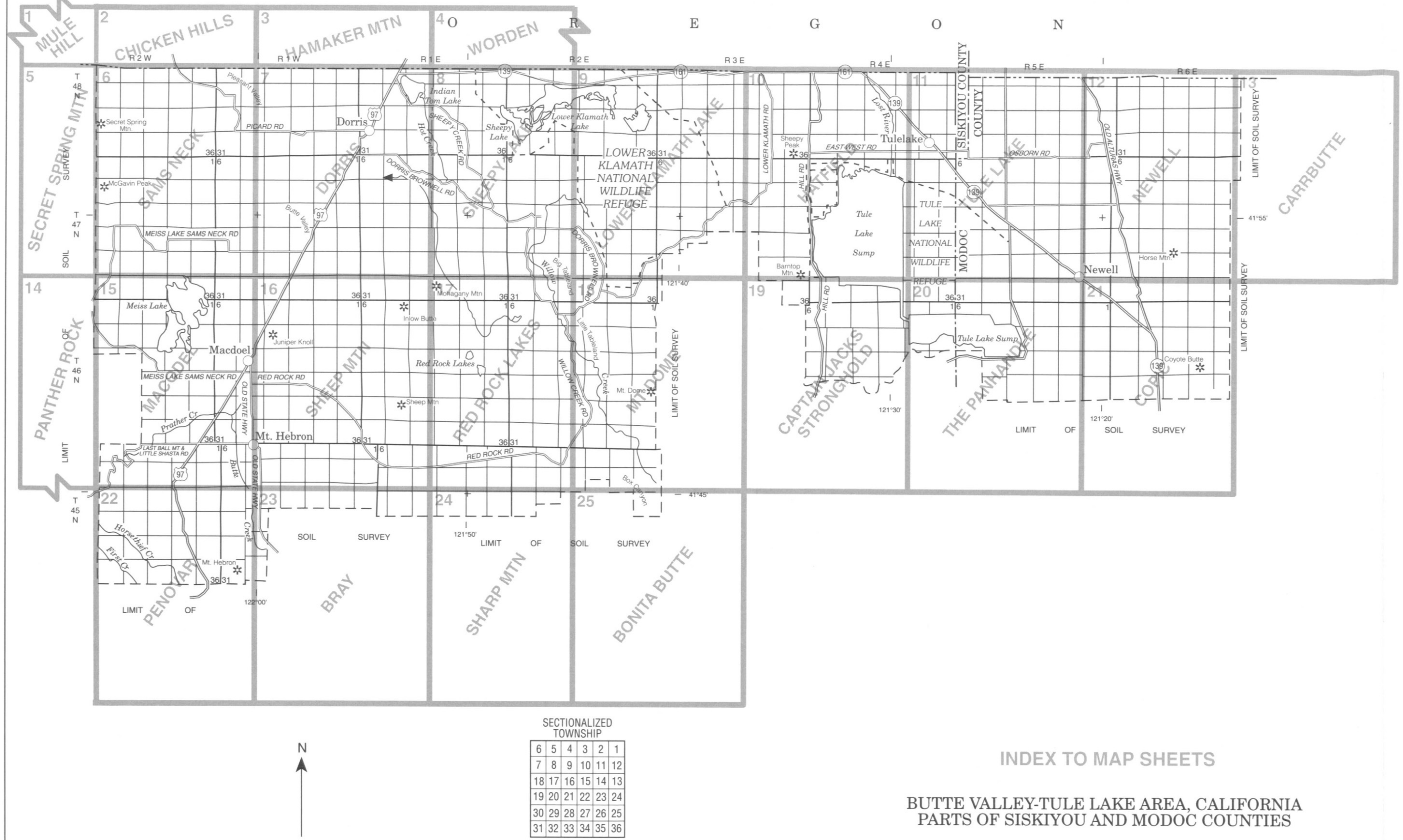
6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Scale 1:253,440

1 0 1 2 3 4 Miles

1 0 4 8 Km

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS

BUTTE VALLEY-TULE LAKE AREA, CALIFORNIA
PARTS OF SISKIYOU AND MODOC COUNTIES

Scale 1:253,440

1 0 1 2 3 4 Miles

1 0 4 8 Km

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE AND FOREST SERVICE

BUTTE VALLEY-TULE LAKE AREA, CALIFORNIA
PARTS OF SISKIYOU AND MODOC COUNTIES

REGENTS OF THE UNIVERSITY OF CALIFORNIA (AGRICULTURAL EXPERIMENT STATION)
UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE
CALIFORNIA DEPARTMENT OF FORESTRY, SOIL VEGETATION SURVEY

SOIL LEGEND

SYMBOL	NAME
101	Avis stony sandy loam, 5 to 30 percent slopes
102	Capjac silt loam, 0 to 1 percent slopes
103	Capjac silt loam, ponded, 0 to 1 percent slopes
104	Capona cobbly loam, 5 to 30 percent slopes
105	Capona-Rock outcrop complex, 0 to 5 percent slopes
106	Dehill fine sandy loam, 0 to 5 percent slopes
107	Dehill fine sandy loam, 5 to 15 percent slopes
108	Demox stony sandy loam, 2 to 15 percent slopes
109	Demox-Rubble land complex, 15 to 50 percent slopes
110	Doel sandy loam, 0 to 2 percent slopes
111	Dotta sandy loam, 0 to 5 percent slopes
112	Dunnlake-Bucklake complex, 2 to 15 percent slopes
113	Dunnlake-Bucklake complex, 15 to 30 percent slopes
114	Dunnlake-Bucklake-Lequieu complex, 2 to 9 percent slopes
115	Dunnlake-Lequieu complex, 2 to 9 percent slopes
116	Dunnlake-Rangee complex, 0 to 5 percent slopes
117	Eastable loam, 0 to 5 percent slopes
118	Eastable-Hedox complex, 2 to 9 percent slopes
119	Esro loam, 0 to 2 percent slopes
120	Esro loam, drained, 0 to 2 percent slopes
121	Forbar fine sand, 0 to 2 percent slopes
122	Fordney loamy fine sand, 0 to 2 percent slopes
123	Fordney loamy fine sand, 5 to 15 percent slopes
124	Fordney loamy fine sand, slightly wet, 0 to 2 percent slopes
125	Fredonyer-Mahogan complex, 30 to 50 percent slopes
126	Fredonyer-Rock outcrop complex, 30 to 50 percent slopes
127	Hedox-Porterfield complex, 5 to 15 percent slopes
128	Hedox-Porterfield complex, 15 to 30 percent slopes
129	Hedox-Porterfield complex, stony, 15 to 30 percent slopes
130	Inlow-Modoc complex, 0 to 2 percent slopes
131	Inlow-Ocho complex, 0 to 2 percent slopes
132	Inlow-Ocho-Modoc complex, 0 to 2 percent slopes
133	Kalo stony sandy loam, 5 to 30 percent slopes
134	Kalo very stony sandy loam, 30 to 50 percent slopes
135	Karoc-Rock outcrop complex, 50 to 75 percent slopes
136	Laki fine sandy loam, 0 to 2 percent slopes
137	Laki-Henley complex, 0 to 2 percent slopes
138	Lalos very fine sandy loam, 2 to 15 percent slopes
139	Lalos-Blownout land complex, 0 to 9 percent slopes
140	Lamath silt loam, 0 to 1 percent slopes
141	Leavers sandy loam, 0 to 2 percent slopes
142	Leavers sandy loam, drained, 0 to 5 percent slopes
143	Lequieu very stony loam, 0 to 2 percent slopes
144	Lequieu-Adieux complex, 0 to 5 percent slopes
145	Lorella-Fiddler complex, 5 to 30 percent slopes
146	Madeline-Capona complex, 2 to 15 percent slopes
147	Mahogan-Fredonyer complex, 5 to 30 percent slopes
148	Medford silty clay loam, 0 to 2 percent slopes
149	Modoc loam, 0 to 2 percent slopes
150	Modoc loam, bedrock substratum, 2 to 5 percent slopes
151	Mojo-Pinehurst complex, 5 to 15 percent slopes
152	Mojo-Pinehurst complex, 15 to 30 percent slopes
153	Mudco gravelly sandy loam, 2 to 5 percent slopes
154	Munnell gravelly loam, 0 to 5 percent slopes
155	Munnell gravelly loam, slightly wet, 0 to 2 percent slopes
156	Ocho Variant silt loam, 0 to 2 percent slopes
157	Orset sandy loam, 0 to 9 percent slopes
158	Pinehurst-Kalo complex, 5 to 15 percent slopes
159	Pit silty clay, 0 to 2 percent slopes
160	Podus loamy fine sand, 0 to 2 percent slopes
161	Poe loamy fine sand, 0 to 2 percent slopes
162	Poman loamy sand, 0 to 2 percent slopes
163	Rangee Variant-Dotta complex, 0 to 2 percent slopes
164	Rojo sandy loam, 0 to 2 percent slopes
165	Rojo sandy loam, 2 to 9 percent slopes
166	Rubble land
167	Salisbury-Denbar complex, 0 to 9 percent slopes
168	Searles-Dunnlake complex, 15 to 30 percent slopes
169	Searles-Dunnlake complex, 30 to 50 percent slopes
170	Searles-Orhood complex, 15 to 30 percent slopes
171	Searles-Orhood complex, 30 to 50 percent slopes
172	Searles-Rubble land complex, 50 to 75 percent slopes
173	Searles-Truax-Orhood complex, 2 to 15 percent slopes
174	Searles Variant very stony loam, 0 to 5 percent slopes
175	Sheld stony sandy loam, 9 to 30 percent slopes
176	Sheld very stony sandy loam, 50 to 65 percent slopes
177	Snell very stony loam, 5 to 30 percent slopes
178	Stukel sandy loam, 5 to 30 percent slopes
179	Stukel-Capona complex, 2 to 30 percent slopes
180	Teeters silt loam, 0 to 1 percent slopes
181	Truax fine sandy loam, 0 to 5 percent slopes
182	Truax-Searles complex, 2 to 9 percent slopes
183	Tulana silt loam, 0 to 1 percent slopes
184	Tulana Variant mucky peat, 0 to 1 percent slopes
185	Tulebasin mucky silty clay loam, 0 to 1 percent slopes
186	Zanbur sandy loam, 0 to 2 percent slopes
187	Zuman loamy fine sand, 0 to 1 percent slopes
188	Zuman silt loam, ponded, 0 to 1 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

POWER TRANSMISSION LINE
(normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban area)
- Church
- School
- Indian mound (label)
- Located object (label)
- Tank (label)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF BUTTE VALLEY – TULE LAKE AREA, CALIFORNIA,
PARTS OF MODOC AND SISKIYOU COUNTIES
(MULE HILL QUADRANGLE)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 2
SOIL SURVEY OF BUTTE VALLEY — TULE LAKE AREA, CALIFORNIA,
PARTS OF MODOC AND SISKIYOU COUNTIES
(CHICKEN HILLS QUADRANGLE)

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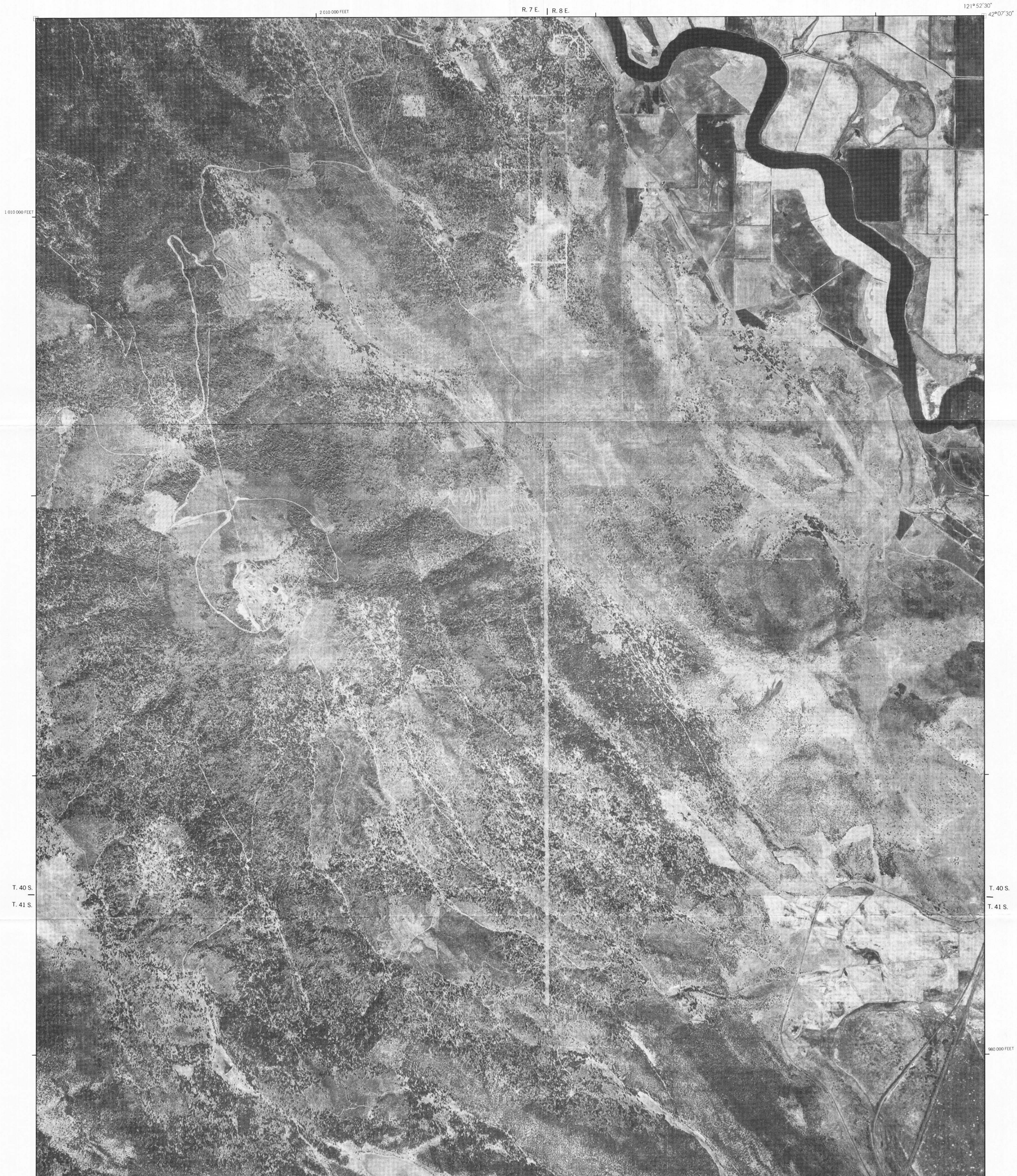
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

BUTTE VALLEY-TULE LAKE, CALIFORNIA NO. 2

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 3
SOIL SURVEY OF BUTTE VALLEY – TULE LAKE AREA, CALIFORNIA,
PARTS OF MODOC AND SISKIYOU COUNTIES
(HAMAKER MOUNTAIN QUADRANGLE)



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

SOIL SURVEY OF BUTTE VALLEY – TULE LAKE AREA, CALIFORNIA,
PARTS OF MODOC AND SISKIYOU COUNTIES
(WORDEN QUADRANGLE)

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 6
SOIL SURVEY OF BUTTE VALLEY – TULE LAKE AREA, CALIFORNIA,
PARTS OF MODOC AND SISKIYOU COUNTIES
(SAMS NECK QUADRANGLE)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

SOIL SURVEY OF BUTTE VALLEY – TULE LAKE AREA, CALIFORNIA,
PARTS OF MODOC AND SISKIYOU COUNTIES
(SHEEPY LAKE QUADRANGLE)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

SOIL SURVEY OF BUTTE VALLEY — TULE LAKE AREA, CALIFORNIA, PARTS OF MODOC AND SISKIYOU COUNTIES
(HATFIELD QUADRANGLE)

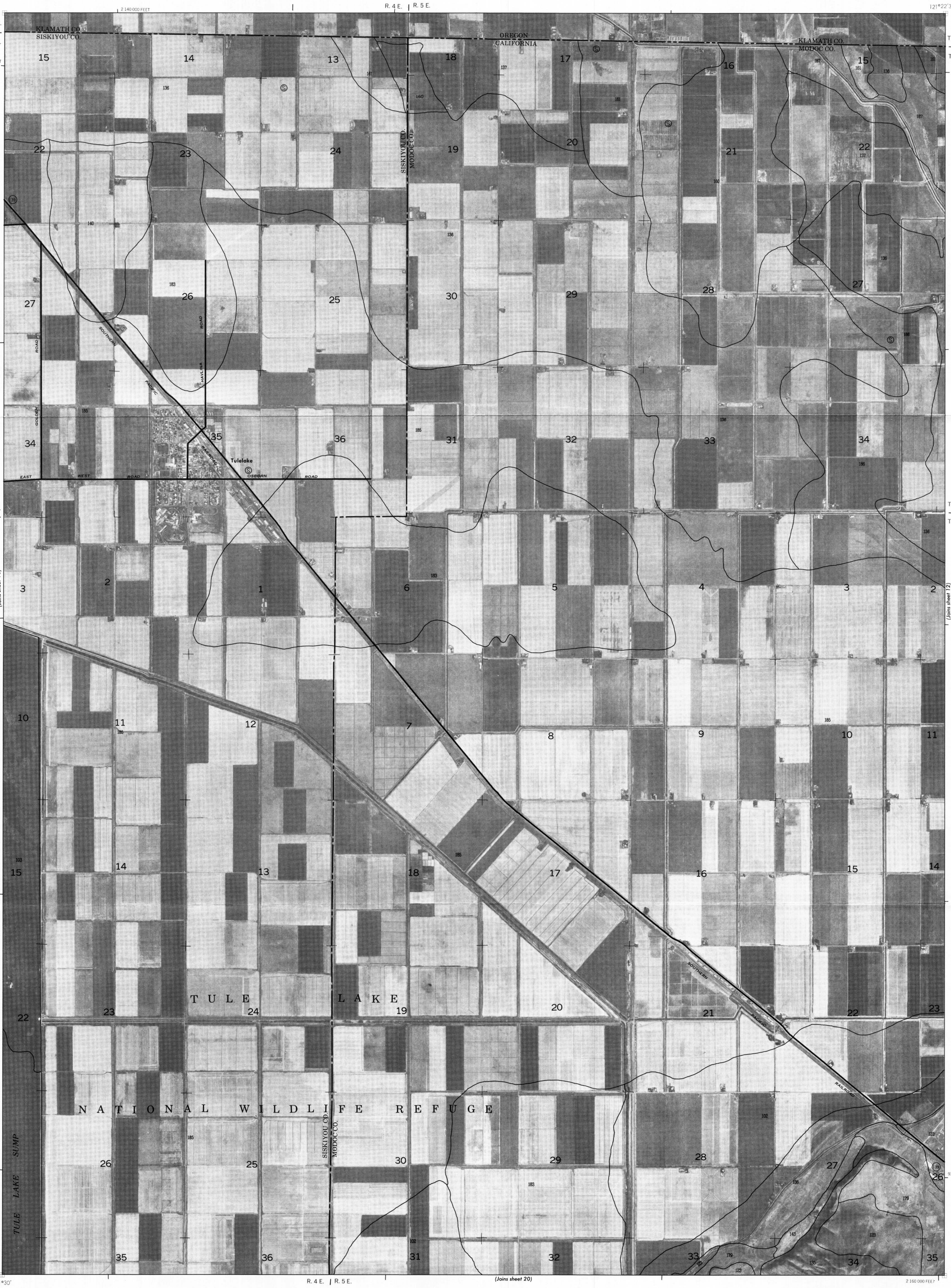
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

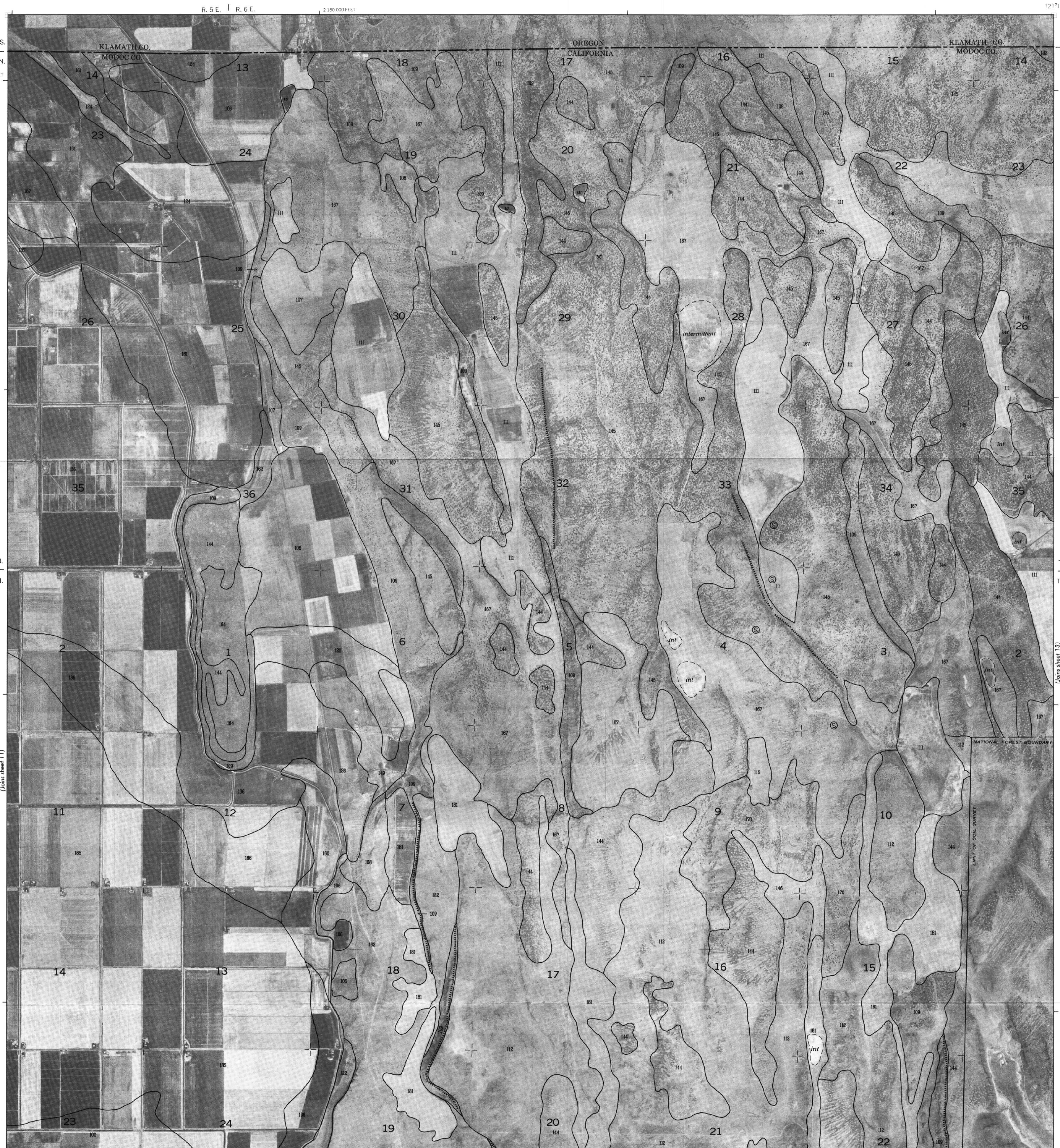
SHEET NO. 11
SOIL SURVEY OF BUTTE VALLEY — TULE LAKE AREA, CALIFORNIA,
PARTS OF MODOC AND SISKIYOU COUNTIES
(TULE LAKE QUADRANGLE)



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N



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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

SOIL SURVEY OF BUTTE VALLEY – TULE LAKE AREA, CALIFORNIA,
PARTS OF MODOC AND SISKIYOU COUNTIES
(CARR BUTTE QUADRANGLE)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

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1 3/4 1/2 1/4 0 1 2 MILES

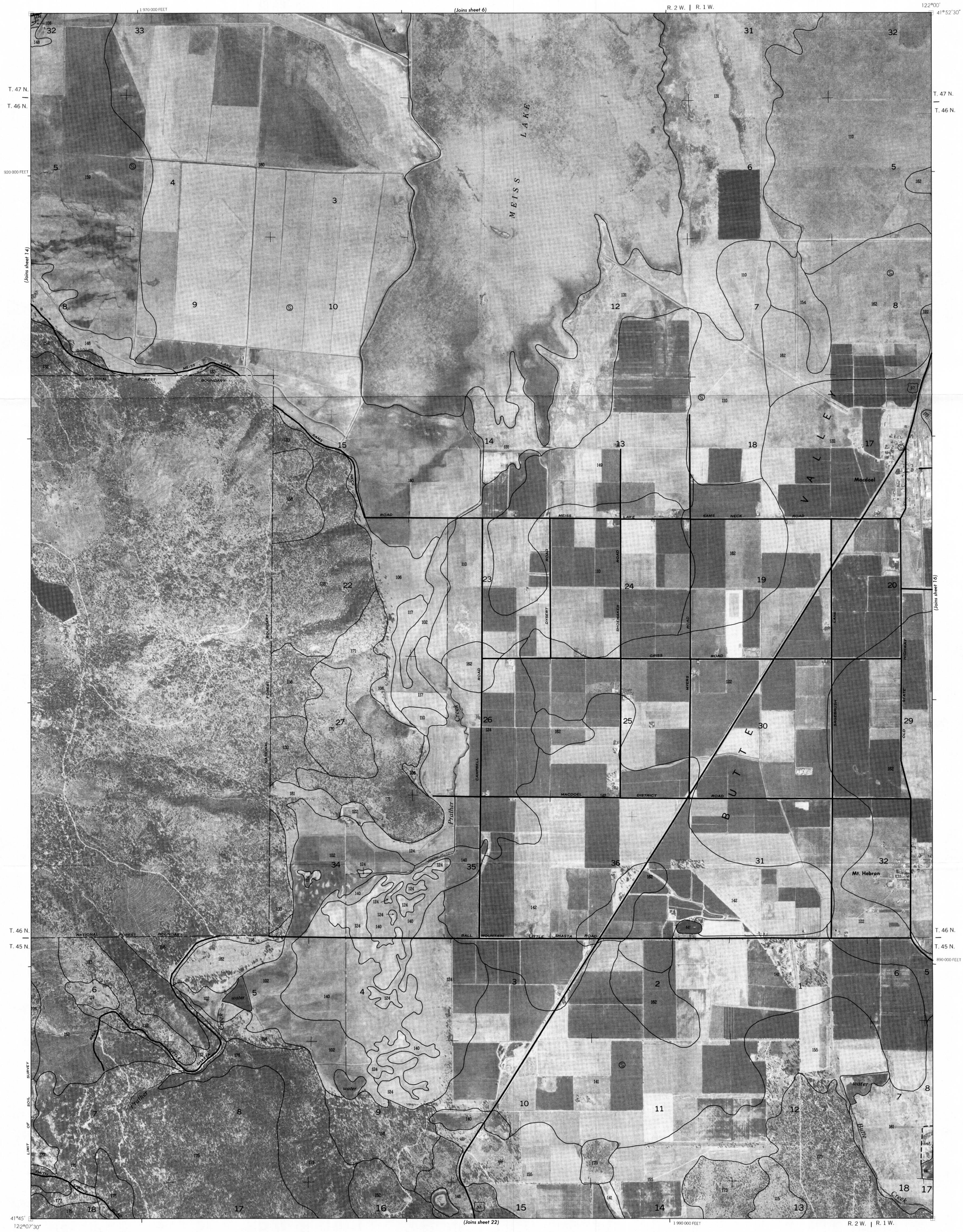
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

SOIL SURVEY OF BUTTE VALLEY — TULE LAKE AREA, CALIFORNIA, PARTS OF MODOC AND SISKIYOU COUNTIES

(MACDOEL QUADRANGLE)



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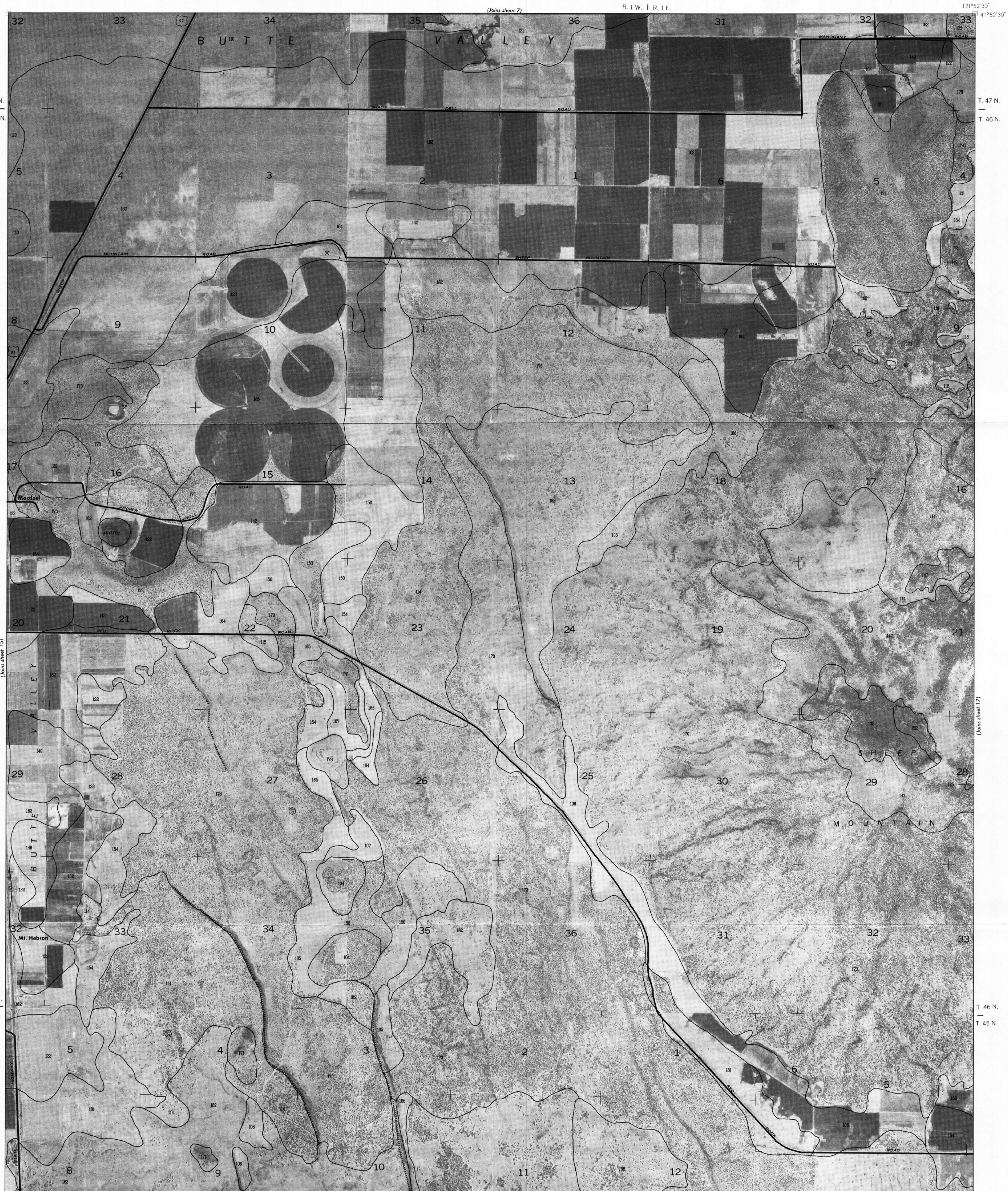
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N



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SCALE 1:24 000

N

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 19
SOIL SURVEY OF BUTTE VALLEY – TULE LAKE AREA, CALIFORNIA,
PARTS OF MODOC AND SISKIYOU COUNTIES
(CAPTAIN JACKS STRONGHOLD QUADRANGLE)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SCALE 1:24 000
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS

N

BUTTE VALLEY-TULE LAKE, CALIFORNIA NO. 19

SOIL SURVEY OF BUTTE VALLEY — TULE LAKE AREA, CALIFORNIA,
PARTS OF MODOC AND SISKIYOU COUNTIES
(THE PANHANDLE QUADRANGLE)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

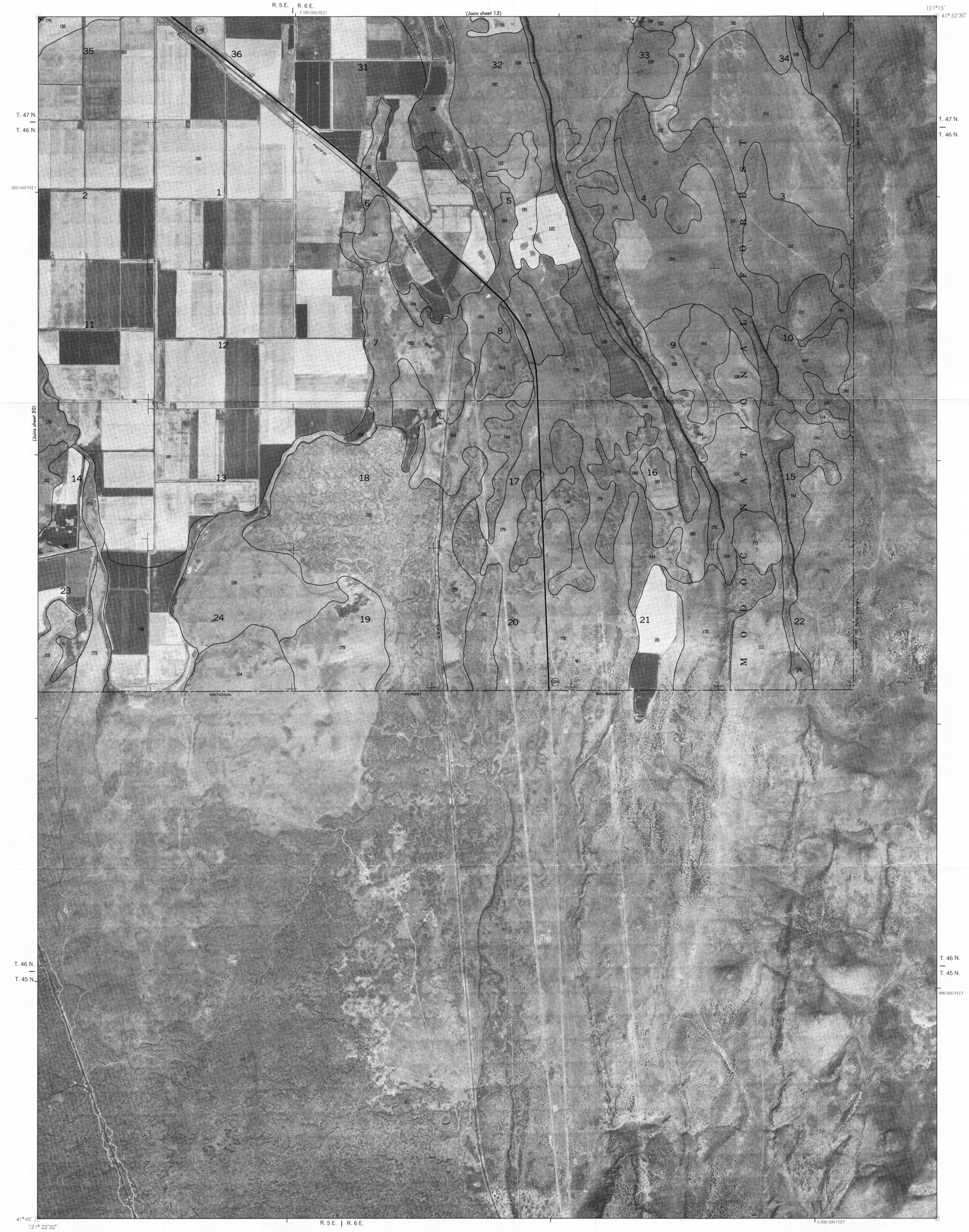
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF BUTTE VALLEY — TULE LAKE AREA, CALIFORNIA, PARTS OF MODOC AND SISKIYOU COUNTIES
(COPIC QUADRANGLE)



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

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U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 22
SOIL SURVEY OF BUTTE VALLEY – TULE LAKE AREA, CALIFORNIA,
PARTS OF MODOC AND SISKIYOU COUNTIES
(PENOYAR QUADRANGLE)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF BUTTE VALLEY — TULE LAKE AREA, CALIFORNIA,
PARTS OF MODOC AND SISKIYOU COUNTIES
(BRAY QUADRANGLE)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

SOIL SURVEY OF BUTTE VALLEY – TULE LAKE AREA, CALIFORNIA,
PARTS OF MODOC AND SISKIYOU COUNTIES
(SHARP MOUNTAIN QUADRANGLE)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

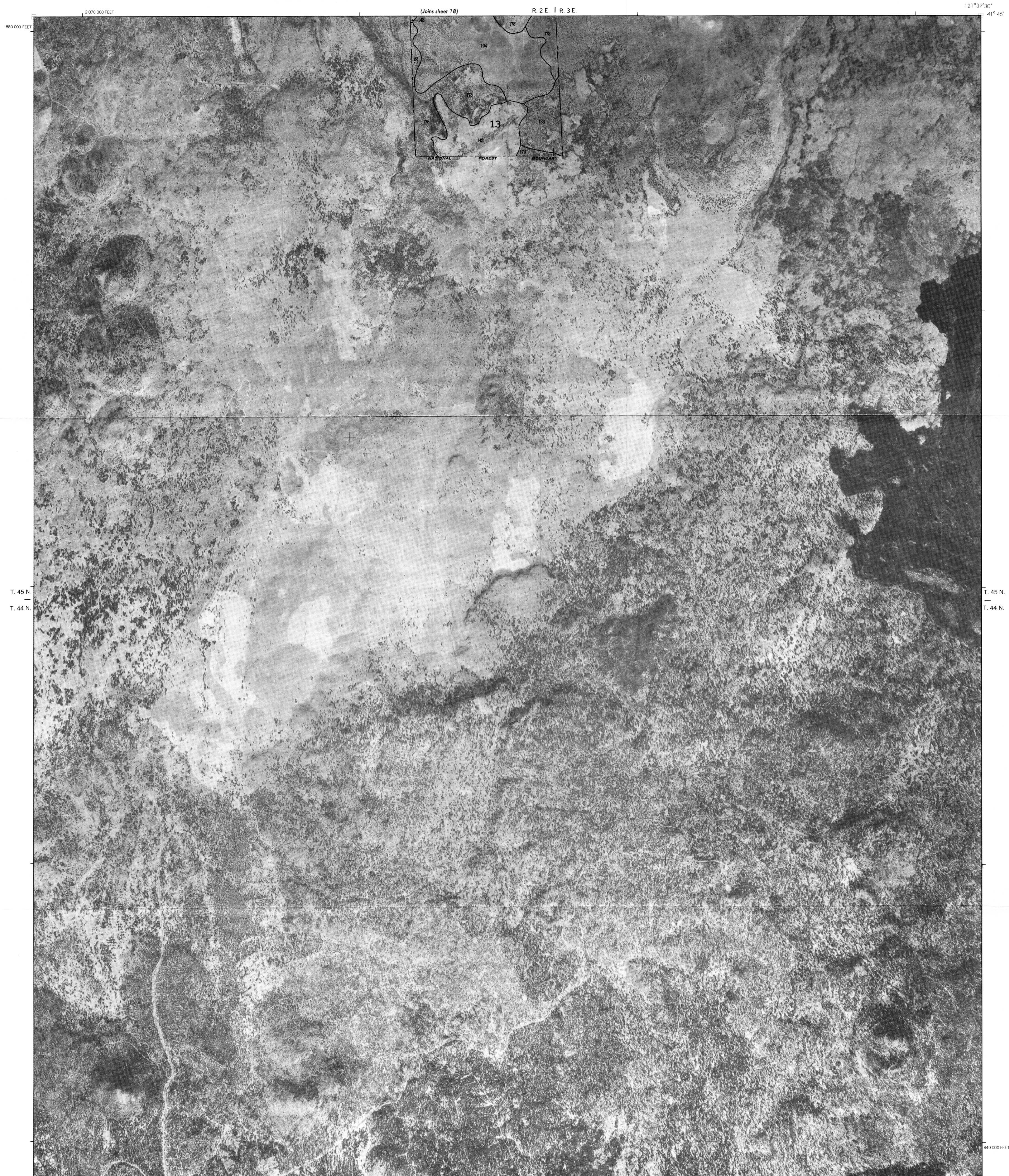
SCALE 1:24 000

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF BUTTE VALLEY – TULE LAKE AREA, CALIFORNIA, PARTS OF MODOC AND SISKIYOU COUNTIES

(BONITA BUTTE QUADRANGLE)



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SCALE 1:24 000

N